

1980

Use of Feed-Evaluation Factors

Feed-evaluation factors (Tables VI-16, VI-17) determine the relative value of various ingredients or feedstuffs when used for feeding dairy cows.

With these factors, the relative value of each available ingredient can be compared with No. 2 shelled corn and 44% soybean oil meal. To determine the comparative value of any ingredient, use the factors listed opposite that ingredient. Multiply the "shelled corn factor" by the cwt price of shelled corn, multiply the "soybean oil meal factor" by the current cwt price of 44% soybean oil meal, and then add the two answers. (NOTE: Subtract if one of the factors is preceded by a minus sign.) Compare the computed value with the actual price of the ingredient. If the computed value for the ingredient is greater than its actual cost, the ingredient being considered is a better buy (by the amount of the difference) than the same nutrients from a combination of corn and soybean oil meal. If the computed value is less than the price of the ingredient, it is not a good buy. For greater precision, include preparation costs for whole grains.

As an example, assume that ground shelled corn is worth \$2.80 per cwt and the price of soybean oil meal 44% is \$4.85. You can buy dried beet pulp for \$2.90 per cwt. Should you use beet pulp in a grain mix?

- i) Beet pulp corn factor (1.014) x corn price (\$2.80) = \$2.839
- ii) Beet pulp oil meal factor (-0.064) x soybean meal price (\$4.85) = (-)0.829
- iii) Beet pulp computed value = sum (or difference) = \$2.529
- iv) Since the computed value of beet pulp (\$2.53) is less than its cost price (\$2.90), beet pulp would not be a good buy under these conditions.

CAUTION: If an ingredient is shown to be a good buy, it should be used only within the limits suggested in Table VI-21.

- Note:
1. Factor for converting price of 48% soybean oil meal to 44% basis for use of evaluation factors: Multiply price of 50% meal by 0.94.
 2. Factors in Table VI-17 should be used only to determine which manufactured feeds and supplements are to be considered in providing net energy at lowest unit cost in finished feeds.
 3. Use ingredients and feeds with greatest margin of value over cost to the fullest extent possible, in accordance with Table VI-21.

Table VI-16. Feed-Evaluation Factors for Various Feedstuffs Used in Dairy Cow Rations.^a

Ingredient	Shelled corn factor	Soybean oil meal factor
Shelled corn, No. 2	1.000	0.000
Ear corn (corn and cob meal, no husks)	0.914	-0.015
Oats, spelt (25% of mix or less)	0.933	0.079
(over 25% of mix)	0.813	0.098
Barley	0.938	0.073
Wheat	0.954	0.056
Rye	0.786	0.104
Milo or sorghum	0.967	0.015
Buckwheat	0.789	0.053
Hominy feed	1.053	0.013
Beet pulp, dried	1.021	-0.062
Citrus pulp, dried	1.048	-0.102
Molasses (not over 10% of mix)	1.069	-0.171
Wheat bran	0.655	0.191
Wheat midds (standard)	0.777	0.198
Corn gluten feed	0.526	0.374
Brewers' grains, dried	0.455	0.393
Malt sprouts	0.385	0.423
Distillers' dried corn grains	0.737	0.306
Soybeans (whole)	0.399	0.711
Soybean oil meal, 44%	0.000	1.000
Soybean oil meal, 48%	-0.125	1.144
Cottonseed meal, 41% solvent	0.029	0.776
Linseed meal, 36% solvent	0.212	0.698
Corn gluten meal, 41%	0.182	0.836
Corn gluten meal, 60%	-0.322	1.287
Alfalfa meal, 20%	0.286	0.310
Alfalfa meal, 17%	0.326	0.246
Alfalfa meal, 15%	0.345	0.206
Legume hay, average analysis	0.278	0.223
Grass hay, average analysis	0.471	0.045
Mixed hay, mainly legume	0.369	0.152
Mixed hay, mainly grass	0.411	0.100
Corn silage, 70% moisture	0.232	-0.002
Corn factory waste, 78%	0.189	-0.004
Brewers' grains, wet (Brewers' malt)	0.121	0.082
Potatoes, tubers	0.224	-2.004

^aThese factors are for feeds fed to dairy cows; they may not be valid for other classes of livestock.

1995

Use of Feed-Evaluation Factors

Feed-evaluation factors (see tables 1.6 and 1.7) are used to determine the economic nutritional value of forages or various ingredients and feedstuffs used for feeding dairy cows. With these factors, the economic value of each available ingredient can be compared with number 2 shelled corn, 44% soybean oil meal, and alfalfa hay. To determine the

comparative value of any ingredient, use the factors listed opposite that ingredient. Multiply the "shelled corn factor" by the current hundredweight price of shelled corn, multiply the "soybean oil meal factor" by the current hundredweight price of 44% soybean oil meal, and, when working with forages, multiply the "alfalfa hay factor" by the current hundredweight price of alfalfa hay; then add the two (or three) answers. (Note: Subtract if one of the factors is preceded by a minus sign.) Compare the

computed value with the actual price of the ingredient. If the computed value of the ingredient is greater than the actual price, the ingredient being considered is a better buy (by the amount of the difference) than the same nutrients from a combination of shelled corn, soybean oil meal, and (with forages) alfalfa hay. If the computed value is less than the price of the ingredient, it is not a good buy. For greater precision, include preparation costs (such as for grinding and mixing) for whole grains.

Example 1:

Assume that dry, shelled corn is worth \$4.60 per hundredweight and the price of 44% soybean oil meal is \$10.15. You can buy corn distiller's grain (dark) for \$8.11 per hundredweight. Should you use distiller's in a grain mix?

$$\text{distiller's grain (dark) corn factor (0.599) x corn price (\$4.60) = \$2.76}$$

$$\text{distiller's grain (dark) soybean meal factor (0.469) x soybean meal price (\$10.15) = \$4.76}$$

$$\text{distiller's grain (dark) computed value = sum (or difference) = \$2.76 + \$4.76 = \$7.52}$$

Since the computed distiller's grain value (\$7.52) is less than its price (\$8.11), distiller's grain would not be a good buy under these conditions.

Example 2:

Assume the same prices for shelled corn and 44% soybean meal given in example 1 and a price of \$5.65 per hundredweight for alfalfa hay. You can purchase first-cut, early-head MMG hay at \$5.05 per hundredweight. Should you buy this hay?

$$\text{MMG hay (first-cut, early-head) corn factor (-0.088) x corn price (\$4.60) = -\$0.40}$$

$$\text{MMG hay (first-cut, early-head) soybean oil meal factor (-0.229) x soybean oil meal price (\$10.15) = -\$2.32}$$

$$\text{MMG hay (first-cut, early-head) alfalfa hay factor (1.492) x alfalfa hay price (\$5.65) = \$8.43}$$

$$\text{MMG hay (first-cut, early-head) computed value = sum (or difference) = \$8.43 - \$2.32 - \$0.40 = \$5.71}$$

Since the computed value of the MMG hay (\$5.71) is greater than its price (\$5.05), the MMG hay would be a good buy under these conditions.

Caution: If an ingredient is shown to be a good buy, it should be used only within the limits suggested in table 5.33 on page 130.

Notes: (1.) To convert the price of 48% soybean oil meal to a 44% basis to use the feed-evaluation factors, multiply the price of 48% soybean meal by 0.94. (2.) Use ingredients and feeds with the greatest margin of value over cost to the fullest extent possible, in accordance with table 5.33 on page 130. (3.) Preferably use least-cost computer formulations to determine which ingredients and what levels should be used in rations balanced for all nutrients, including soluble protein, undegradable protein, fiber, nonstructural or nonfibrous carbohydrates, and fat, among others.

Table 1.6
Feed-evaluation factors for feedstuffs used in dairy cow rations

Ingredient name	Crude protein (% DM)	Net energy, NEL (Mcal/lb)	Dry matter (%)	Feed factors	
				Corn	Soybean
Corn, shelled (15.5%)	10.0	0.90	88.0	1.000	0.000
Soybean meal, 44%	50.0	0.88	90.0	0.000	1.000
Apple pomace, no hulls	4.9	0.71	89.0	0.871	-0.073
Bakery product	11.0	0.94	92.0	1.078	0.014
Barley	12.8	0.87	89.0	0.901	0.077
Barley, high-moisture	13.1	0.87	72.0	0.723	0.068
Beet pulp	9.7	0.81	91.0	0.913	0.018
Blood meal	93.0	0.68	91.0	-1.010	2.078
Brewer's grain, dried	27.1	0.68	92.0	0.293	0.497
Brewer's grain, wet	28.0	0.68	22.0	0.065	0.124
Brewer's yeast	46.9	0.83	93.0	0.007	0.968
Candy	5.2	1.10	94.0	1.488	-0.182
Candy product	10.8	1.05	90.0	1.215	-0.022
Canola	40.8	0.77	92.5	0.075	0.824
Chocolate	12.9	1.30	95.0	1.600	-0.041
Citrus pulp, dry	6.7	0.80	91.0	0.974	-0.055
Corn, ear—dry	9.0	0.81	87.0	0.890	0.000
Corn, ear—high-moisture	8.8	0.81	69.0	0.709	-0.004
Corn, shelled—high-moisture	9.5	0.90	74.4	0.856	-0.010
Corn distiller's, light	29.0	0.90	92.0	0.563	0.483
Corn distiller's, dark	29.0	0.93	91.0	0.599	0.469
Corn distiller's, wet	28.1	0.92	7.0	0.047	0.035
Corn distiller's, sol. only	29.8	0.93	93.0	0.592	0.500
Corn gluten feed	23.0	0.87	90.0	0.657	0.331
Corn gluten meal, 60%	67.2	0.94	90.0	-0.343	1.411
Cottonseed, whole	23.7	0.98	88.4	0.781	0.313
Cottonseed, de-linted	23.0	1.01	90.0	0.855	0.293
Cottonseed meal, 41%	45.6	0.79	91.0	-0.018	0.926
Donuts	8.0	1.10	82.0	1.235	-0.096
Feather meal	88.0	0.70	92.0	-0.966	1.988
Fish meal, Menhaden	66.7	0.76	92.0	-0.598	1.481
Hominy feed	11.5	0.91	90.0	1.000	0.035

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Table 1.6
Feed-evaluation factors for feedstuffs used in dairy cow rations (continued)

Ingredient name	Crude protein, (% DM)	Net energy, NEL (Mcal/lb)	Dry matter (%)	Feed factors	
				Corn	Soybean
Linseed meal	37.4	0.79	91.0	0.188	0.720
Lupins	41.9	0.81	85.0	0.097	0.773
Malt sprouts	28.1	0.74	94.0	0.362	0.516
Meat and bone meal	54.1	0.74	93.0	-0.310	1.179
Oats	13.0	0.80	89.0	0.798	0.101
Oats, high-moisture	12.5	0.79	79.0	0.707	0.081
Oat mill by-product	3.9	0.34	92.0	0.392	0.003
Peanut meal	52.3	0.80	93.0	-0.176	1.115
Peanut skins	17.4	0.68	94.0	0.551	0.256
Potatoes, raw	8.9	0.85	91.0	0.990	-0.014
Ren Pro	58.0	0.70	93.0	-0.468	1.290
Ren Plus	71.1	0.70	93.0	-0.789	1.624
Rye	13.8	0.88	88.0	0.880	0.098
Sorghum or milo	10.4	0.84	89.0	0.918	0.026
Soybean meal, treated/high-UIP	48.7	0.89	92.0	0.047	0.986
Soybeans, heated	41.8	0.99	90.0	0.359	0.766
Soybeans, whole	41.8	0.96	90.0	0.317	0.774
Soybean meal, 48%	54.5	0.91	90.0	-0.070	1.104
Soyhulls	12.1	0.80	90.0	0.829	0.080
Triticale	17.6	0.88	90.0	0.806	0.194
Wheat	11.3	0.89	89.0	0.965	0.035
Wheat bran	17.1	0.73	89.0	0.599	0.221
Wheat midds	18.0	0.71	89.0	0.549	0.249
Whey, dried	13.0	0.85	93.0	0.907	0.091
Whey, liquid—acid	13.0	0.85	7.0	0.068	0.007
Whey, liquid—sweet	9.1	0.81	7.0	0.071	0.000
Whey, liquid—Leprino	29.3	0.88	9.2	0.053	0.050

Table 1.7

Feed-evaluation factors for forages fed to dairy cows

Feed ingredient	Feed factors			Crude protein (% DM)	Net energy, NEL (Mcal/lb)	NDF (% DM)	Dry matter (%)
	Corn	Soybean meal	Alfalfa				
Corn, shelled (15.5%)	1.000	0.000	-0.000	10.0	0.90	9.0	88.0
Soybean meal, 44%	0.000	1.000	0.000	50.0	0.88	14.0	90.0
Legume hay, avg analysis	-0.000	0.000	1.000	18.6	0.60	47.7	90.0
Grass hay, avg analysis	-0.106	-0.424	1.761	10.5	0.59	66.0	90.0
Grass haylg, avg analysis	-0.053	-0.131	0.674	12.6	0.56	62.5	39.0
MMG hay, avg analysis	-0.104	-0.308	1.554	12.5	0.57	62.0	90.0
MMG haylg, avg analysis	-0.064	-0.103	0.646	14.0	0.54	61.0	40.0
Legume hay, avg analysis	-0.000	0.000	1.000	18.6	0.60	47.7	90.0
Legume haylg, avg analysis	-0.045	0.001	0.539	19.3	0.57	51.0	45.0
MML hay, avg analysis	-0.064	-0.115	1.246	16.8	0.59	54.0	90.0
MML haylg, avg analysis	-0.044	-0.040	0.577	17.4	0.57	54.0	43.0
Corn sil, avg analysis	0.100	-0.126	0.460	8.8	0.69	49.0	33.0
Small-grain sil, avg analysis	-0.17	-0.101	0.550	14.0	0.63	59.0	32.3
Sorghum-sudan sil, avg analysis	-0.034	-0.124	0.548	11.0	0.57	64.1	30.0
Alfalfa meal, 22%	-0.260	-0.086	1.695	23.9	0.69	60.0	93.0
Alfalfa meal, 20%	-0.248	-0.094	1.593	22.0	0.64	60.0	92.0
Alfalfa meal, 17%	-0.182	-0.169	1.588	18.9	0.63	60.0	92.0
Alfalfa meal, 15%	-0.163	-0.182	1.506	17.3	0.60	60.0	90.0
Grass hay, first cut, prehead	-0.060	-0.176	1.484	18.4	0.69	56.0	89.0
Grass hay, first cut, early head	-0.153	-0.336	1.755	14.5	0.63	65.0	89.0
Grass hay, first cut, full head	-0.289	-0.486	2.042	11.0	0.55	75.3	89.0
Grass hay, first cut, mature	-0.363	-0.619	2.265	7.7	0.50	82.7	89.0
Grass hay, aftermath avg	-0.196	-0.343	1.796	14.5	0.61	66.9	89.0
Grass hay, late fall	-0.097	-0.247	1.591	16.5	0.66	59.8	89.0
Legume hay, first cut, pre-bud	0.046	0.155	0.801	23.9	0.68	40.5	87.0
Legume hay, first cut, bud	0.094	0.058	0.808	19.5	0.64	42.0	87.0
Legume hay, first cut, bloom	0.061	-0.106	1.016	14.7	0.59	49.0	87.0
Legume hay, first cut, mature	-0.064	-0.258	1.278	10.6	0.50	59.2	87.0
Legume hay, aftermath avg	0.098	0.053	0.809	19.3	0.64	42.0	87.0
Legume hay, late fall	0.078	0.096	0.808	21.3	0.66	41.3	87.0
MMG hay, first cut, prehead	-0.031	-0.093	1.306	19.8	0.69	52.1	88.0
MMG hay, first cut, early head	-0.088	-0.229	1.492	15.8	0.63	59.0	88.0
MMG hay, first cut, full head	-0.198	-0.387	1.771	11.9	0.56	68.7	88.0
MMG hay, first cut, mature	-0.292	-0.517	1.984	8.4	0.49	76.8	88.0
MMG hay, aftermath avg	-0.119	-0.243	1.542	15.7	0.62	60.7	88.0
MMG hay, late fall	-0.045	-0.167	1.403	17.7	0.67	55.2	88.0

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Table 1.7Feed-evaluation factors for forages fed to dairy cows (*continued*)

Feed ingredient	Feed factors			Crude protein (% DM)	Net energy, NEL (Mcal/lb)	NDF (% DM)	Dry matter (%)
	Corn	Soybean meal	Alfalfa				
MML hay, first cut, prebud	0.032	0.059	1.006	22.5	0.70	44.4	88.0
MML hay, first cut, bud	0.033	-0.040	1.053	18.3	0.64	47.8	88.0
MML hay, first cut, bloom	-0.024	-0.203	1.293	14.0	0.59	55.6	88.0
MML hay, first cut, mature	-0.138	-0.347	1.526	9.9	0.50	65.0	88.0
MML hay, aftermath avg	0.035	-0.048	1.062	18.1	0.64	48.0	88.0
MML hay, late fall	0.024	0.025	0.971	20.0	0.64	45.9	88.0
Grass haylg, first cut, prehead	-0.015	-0.007	0.528	21.0	0.67	49.5	40.0
Grass haylg, first cut, early head	-0.048	-0.076	0.625	16.6	0.60	57.5	40.0
Grass haylg, first cut, full head	-0.095	-0.142	0.734	12.6	0.52	66.6	40.0
Grass haylg, first cut, mature	-0.123	-0.196	0.801	8.8	0.45	73.0	40.0
Grass haylg, aftermath avg	-0.054	-0.091	0.620	14.5	0.55	59.2	40.0
Grass haylg, late fall	-0.081	-0.045	0.614	18.9	0.58	58.0	40.0
Legume haylg, first cut, prebud	-0.008	0.077	0.499	25.0	0.69	43.3	47.0
Legume haylg, first cut, bud	0.001	0.042	0.476	21.0	0.62	44.9	47.0
Legume haylg, first cut, bloom	-0.037	-0.030	0.577	17.0	0.55	52.3	47.0
Legume haylg, first cut, mature	-0.096	-0.133	0.744	12.0	0.47	63.2	47.0
Legume haylg, aftermath avg	-0.006	0.049	0.434	20.0	0.57	45.0	47.0
Legume haylg, late fall	-0.016	0.075	0.427	22.1	0.59	44.0	47.0
MMG haylg, first cut, prehead	-0.012	0.010	0.533	22.0	0.68	48.0	42.0
MMG haylg, first cut, early head	-0.039	-0.049	0.596	17.7	0.60	54.4	42.0
MMG haylg, first cut, full head	-0.080	-0.123	0.717	13.7	0.54	63.0	42.0
MMG haylg, first cut, mature	-0.117	-0.186	0.802	9.6	0.46	70.6	42.0
MMG haylg, aftermath avg	-0.062	-0.041	0.579	17.4	0.55	55.7	42.0
MMG haylg, late fall	-0.062	-0.025	0.594	19.7	0.60	54.5	42.0
MML haylg, first cut, prebud	-0.012	0.055	0.504	24.0	0.68	44.9	45.0
MML haylg, first cut, bud	-0.015	0.011	0.514	19.9	0.61	48.1	45.0
MML haylg, first cut, bloom	-0.054	-0.060	0.619	15.9	0.54	55.9	45.0
MML haylg, first cut, mature	-0.105	-0.149	0.756	11.2	0.46	65.7	45.0
MML haylg, aftermath avg	-0.028	0.019	0.481	19.2	0.56	48.6	45.0
MML haylg, late fall	-0.030	0.036	0.490	21.3	0.60	47.5	45.0
Corn sil, urea	0.064	-0.087	0.467	13.2	0.69	49.0	34.0
Corn sil, NH3	0.075	-0.099	0.469	12.0	0.69	49.0	34.0

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Table 1.7
Feed-evaluation factors for forages fed to dairy cows (continued)

Feed ingredient	Feed factors			Crude protein (% DM)	Net energy, NEL (Mcal/lb)	NDF (% DM)	Dry matter (%)
	Corn	Soybean meal	Alfalfa				
Small-grain sil, boot	0.016	-0.080	0.494	16.0	0.72	54.0	30.0
Small-grain sil, early head	-0.051	-0.143	0.662	14.0	0.68	68.0	30.0
Small-grain sil, milk	-0.073	-0.159	0.662	11.0	0.58	72.0	30.0
Small-grain sil, dough	-0.100	-0.220	0.848	10.0	0.60	77.4	34.0
Grass pasture, spring, pre-head	0.019	-0.024	0.282	19.0	0.74	48.2	20.0
Grass pasture, summer, prehead	0.010	-0.025	0.288	19.0	0.72	49.7	20.0
Grass pasture, fall, prehead	0.031	-0.004	0.246	21.0	0.77	43.1	20.0
Grass pasture, early head	-0.022	-0.063	0.358	14.9	0.63	61.0	20.0
Grass pasture, head	-0.036	-0.093	0.401	11.0	0.57	68.0	20.0
Legume pasture, spring, prebloom	0.011	0.032	0.208	25.0	0.73	41.0	20.0
Legume pasture, summer, prebloom	0.003	0.041	0.188	25.0	0.68	41.0	20.0
Legume pasture, fall, prebloom	0.010	0.053	0.175	27.0	0.72	38.0	20.0
Legume pasture, bloom	0.014	0.022	0.173	20.0	0.61	42.0	20.0
MMG pasture, spring	0.011	-0.008	0.266	21.0	0.73	47.0	20.0
MMG pasture, summer	-0.006	-0.008	0.277	21.0	0.69	50.0	20.0
MMG pasture, fall	0.026	0.008	0.238	23.0	0.78	42.0	20.0
MMG pasture, early bloom	-0.033	-0.050	0.356	17.0	0.63	61.0	20.0
MML pasture, spring	0.004	0.007	0.255	23.0	0.73	46.0	20.0
MML pasture, summer	-0.004	0.016	0.235	23.0	0.68	46.0	20.0
MML pasture, fall	0.006	0.025	0.230	25.0	0.74	43.0	20.0
MML pasture, early bloom	-0.042	-0.041	0.347	18.0	0.61	61.0	20.0
Sorghum-sudan pasture, 30-inch	-0.013	-0.055	0.337	15.3	0.64	58.3	20.0
Sorghum-sudan pasture, 40-inch	-0.015	-0.086	0.413	13.3	0.65	61.9	22.0
Pea vine sil	-0.020	-0.071	0.397	13.1	0.57	59.0	25.0
Corn cannery sil	0.034	-0.150	0.542	8.8	0.67	59.0	30.0
Soybean sil	-0.040	-0.022	0.377	17.7	0.55	55.0	28.0
Kale tops	0.044	-0.017	0.144	16.7	0.82	39.7	12.0
Rape tops	0.065	-0.041	0.201	14.0	0.85	41.2	15.0
Swede tops	0.054	-0.029	0.199	16.7	0.85	41.2	15.0
Turnip roots	0.049	-0.044	0.141	9.0	0.89	44.0	9.0
Turnip tops	0.061	-0.022	0.181	17.3	0.86	38.2	15.0

Note: DM = dry matter; NDF = neutral detergent fiber; haylg = haylage; sil = silage; MMG = mixed mainly grass; MML = mixed mainly legume