Table 1. Calculating the true cost of a by-product feed.

Price delivered to the farm	_____ tons @ $_____/ton	$_____
Interest	_____ % for _____ months	_____
Shrinkage and storage losses	_____%	_____
Extra handling cost	_____ Hr @ $_____/Hr	_____
Total cost		_____
Divide total cost by _____ tons		_____
Total cost per ton		$_____

Table 2. Average nutrient concentrations of by-product feeds.

	DM	CP	RUP[1]	EE	NDF	ADF	NE_1	Ash	NFC
	%	%	%CP	%	%	%	Mcal/lb	%	%
		DM Basis							
Oilseed									
Cottonseed, fuzzy	90.1	23.5	22.9	19.3	50.4	40.1	0.88	4.2	2.7
Soybeans, raw	90.0	39.2	30.4	19.2	19.5	13.1	1.25	5.9	16.2
Soybeans, roasted	91.0	43.0	39.4	19.0	22.1	14.7	1.23	5.0	10.9
Energy Supplements									
Bakery waste	84.7	12.5	23.7	9.5	13.9	6.5	1.53	3.8	60.3
Beet pulp	88.3	10.0	76.3	1.1	45.8	23.1	1.07	7.3	35.8
Citrus pulp	85.8	6.9	31.7	4.9	24.2	22.2	0.80	7.2	56.8
Hominy feed	88.5	11.9	31.2	4.2	21.1	6.2	0.85	2.7	60.1
Molasses, sugar cane	74.3	5.8	18.1	0.2	0.4	0.2	0.80	13.3	80.3
Rice bran	90.6	15.5	47.7	15.2	26.1	13.1	0.93	10.4	32.8
Soybean hulls	90.0	13.9	44.6	2.7	60.3	44.6	0.66	4.8	18.3
Tallow	99.8	0.0	--	99.8	--	--	2.06	0.0	--
Wheat bran	89.1	17.3	20.7	4.3	42.5	15.5	0.73	6.3	29.6
Wheat middlings	89.5	18.5	23.7	4.5	36.7	12.1	0.76	5.0	35.3
Medium Protein Supplements									
Brewers grains, wet	21.8	28.4	35.4	4.5	36.7	12.1	0.76	5.0	35.3
Corn gluten feed	89.4	23.8	30.0	3.5	35.5	12.1	0.79	6.8	30.4
Distillers grains with solubles	90.2	29.7	50.8	10.0	38.8	19.7	0.89	5.2	16.3
High Protein Supplements									
Blood meal	90.2	95.5	77.5	1.2	--	--	1.06	2.5	--
Corn gluten meal	86.4	65.0	74.6	2.5	11.1	8.2	1.08	3.3	18.1
Cottonseed meal	90.5	44.5	47.9	1.9	30.5	19.9	0.78	6.7	16.4
Feather meal	93.3	92.0	65.4	4.6	--	--	0.98	3.5	--
Fish meal, menhaden	91.2	68.5	65.8	10.4	--	--	1.06	19.7	--
Peanut meal	92.3	51.8	13.2	1.4	21.4	13.5	0.91	5.8	19.6
Soybean meal, 48%	89.5	53.8	42.6	1.1	9.8	6.2	1.00	6.4	28.9
Forage Extenders									
Cottonseed hulls	89.0	6.2	55.7	2.5	85.0	64.9	0.48	2.8	3.5
Peanut hulls	91.0	7.8	--	2.0	65.0	74.0	0.19	4.2	12.0
Rice hulls	92.0	3.3	--	0.8	82.0	72.0	0.08	20.6	0.0

Source: National Research Council. 2001.
[1]Rumen undegradable protein with DMI of 4% of body weight.

Table 3. Variation in the nutrient content of select by-product feeds.

		CP[1]	UCP	ADF	NDF	EE	Ca	P	Mg	K
WBG[2]	Avg[3]	27.0	2.7	18.0	37.3	6.3	0.24	0.65	0.27	0.26
	Min	24.2	1.6	15.8	33.0	5.7	0.19	0.59	0.25	0.19
	Max	30.6	3.6	20.5	43.6	6.9	0.28	0.76	0.32	0.34
	CV	8.3	24.4	10.6	9.2	6.5	11.03	8.69	8.11	20.02
CGF	Avg	22.9	0.8	12.5	38.8	3.4	0.03	0.84	0.36	1.24
	Min	19.4	0.4	10.7	31.5	2.9	0.02	0.63	0.28	0.95
	Max	33.4	1.9	13.9	44.4	4.4	0.03	1.04	0.46	1.66
	CV	18.7	57.4	8.0	9.9	13.0	19.86	13.93	14.95	16.17
DDG	Avg	31.2	9.4	20.3	35.6	13.0	0.07	0.80	0.02	1.01
	Min	30.4	5.7	11.3	26.5	11.7	0.06	0.77	0.33	0.93
	Max	32.3	12.8	25.1	45.1	15.7	0.07	0.85	0.39	1.10
	CV	2.0	32.4	29.1	23.0	10.2	7.21	3.57	5.36	5.31
H	Avg	11.0	0.9	6.9	19.8	6.5	0.02	0.61	0.24	0.72
	Min	10.1	0.5	4.8	15.8	5.6	0.01	0.46	0.19	0.55
	Max	11.7	1.3	9.9	24.8	8.1	0.06	0.71	0.27	0.84
	CV	5.8	28.2	22.1	15.3	12.3	63.56	13.02	11.58	13.99
SH	Avg	11.8	1.3	46.6	64.4	2.5	0.60	0.13	0.25	1.32
	Min	10.8	1.0	40.4	57.3	1.2	0.18	0.04	0.07	0.35
	Max	14.2	1.6	49.9	71.6	3.7	0.73	0.19	0.29	1.60
	CV	9.8	12.7	6.2	5.9	35.7	25.60	29.99	26.06	26.62

[1]CP = crude protein; UCP = unavailable crude protein; ADF = acid detergent fiber; NDF = neutral detergent fiber; EE = ether extract; Ca = calcium; P = phosphorus; Mg = magnesium; and K = potassium.
[2]WBG = wet brewers grain; CGF = corn gluten feed; DDG = distillers dried grains; H = hominy; and SH = soybean hulls.
[3]Avg = average; Min = minimum; Max = maximum; and CV = coefficient of variation.
Source: DePeters et al. 2000. Prof. Anim Sci. 16:69-99.

Table 4. Suggested limits for by-product feeds in rations.

	Maximum % of DM	Maximum lb DM per day[1]
Oilseed		
Cottonseed, fuzzy	10 - 15	4.5 - 6.7
Cottonseed, delinted	10 - 15	4.5 - 6.7
Soybeans, raw	10	4.5
Soybeans, roasted	10 - 15	4.5 - 6.7
Energy Supplements		
Bakery waste	8 - 10	3.6 - 4.5
Beet pulp	20 - 30	9 - 13.5
Citrus pulp	20 - 40	9 - 18
Hominy feed	20 - 35	9 - 15.7
Molasses	3 - 5	1.3 - 2.2
Rice bran	10 - 15	4.5 - 6.7
Soybean hulls	15 - 25	6.7 - 11.2
Tallow	2 - 3	.9 - 1.3
Wheat bran	15 - 25	6.7 - 11.2
Wheat middlings	15 - 25	6.7 - 11.2
Medium Protein Supplements		
Brewers Grains	15 - 25	6.7 - 11.2
Corn gluten feed	20 - 40	9 - 18
Distillers grains	15 - 40	6.7 - 18
Protein Supplements		
Blood meal	3 - 4	1.3 - 1.8
Corn gluten meal	No Limit	No Limit
Cottonseed meal	No Limit	No Limit
Feather meal	3 - 4	1.3 - 1.8
Fish meal	3 - 4	1.3 - 1.8
Linseed meal	No Limit	No Limit
Meat and bone meal	3 - 8	1.3 - 3.6
Peanut meal	No Limit	No Limit
Soybean meal	No Limit	No Limit
Forage Extenders		
Cottonseed hulls	30 - 35	13.5 - 15.7
Peanut hulls	12 - 15	5.4 - 6.7
Rice hulls	10 - 15	4.5 - 6.7

[1]Amounts are based on an intake of 45 lb dry matter per day and should be adjusted for actual dry matter content.

Table 5. Chemical analysis of unusual by-product feeds (DM basis).

Item	DM (%)	TDN (%)	NE_l (Mcal/lb)	NE_m (Mcal/lb)	NE_g (Mcal/lb)	CP (%)	EE (%)	ADF (%)	Ash (%)	Ca (%)	P (%)	K (%)	Mg (%)
Apple pulp	21.4	74.0	0.77	0.78	0.47	7.8	6.3	26	4.9	0.10	0.10	--	--
Bakery waste	92.0	89.0	0.94	1.00	0.69	10.7	12.7	13	4.4	0.14	0.26	0.53	0.26
Beans, cannery residue	9.4	72.5	0.75	0.76	0.45	23.5	3.0	17	–	–	–	–	–
Beans, green	89.0	63.0	0.65	0.63	0.35	16.9	3.8	32	9.0	–	–	–	–
Bread, waste	68.3	89.3	0.95	1.00	0.69	15.0	2.2	3	2.8	0.14	0.20	0.23	0.05
Cabbage	9.5	85.3	0.89	0.93	0.63	25.3	4.2	20	14.7	0.64	0.35	2.53	0.21
Cantaloupe	10.0	66.0	0.68	0.68	0.37	20.4	8.3	26	–	–	–	–	–
Carrots	12.0	84.0	0.88	0.64	0.64	9.9	1.4	11	8.2	0.40	0.35	2.80	0.20
Cereal byproduct	88.5	87.6	0.90	0.96	0.66	9.1	3.5	4	3.2	0.17	0.29	0.33	0.10
Chocolate byproduct	95.2	102.7	1.16	1.16	0.82	11.9	20.5	16	2.1	0.22	0.30	1.18	0.22
Cookie byproduct	90.1	95.0	1.02	1.06	0.74	9.7	10.6	7	3.0	0.23	0.29	0.46	0.13
Corn, cannery waste	23.0	70.0	0.72	0.73	0.42	8.8	2.7	29	5.9	3.40	0.63	–	–
Cotton gin trash	90.0	44.0	0.43	0.39	0.03	7.4	1.7	46	5.9	0.65	0.12	--	--
Lettuce	5.0	51.0	0.51	0.47	0.15	22.0	4.1	14	15.9	0.86	0.46	4.52	–
Melons	4.1	70.7	0.73	0.74	0.43	11.5	3.3	29	6.6	–	–	–	–
Onions, dried	91.4	57.6	0.59	0.57	0.25	12.6	2.0	28	8.0	1.80	0.21	1.76	0.16
Peaches	10.0	80.0	0.83	0.86	0.55	8.9	3.7	13	–	–	–	–	–
Peanut skins	94.0	65.0	0.67	0.65	0.37	17.4	25.5	16	3.0	0.19	0.20	–	–
Potatoes, fresh	23.0	81.0	0.85	0.90	0.60	9.5	0.4	3	4.8	0.04	0.24	2.17	0.14
Tomatoes	6.0	69.0	0.71	0.70	0.43	16.4	5.0	11	–	0.16	0.49	4.21	–
Turnips, fresh	9.0	85.0	0.89	0.95	0.65	11.8	1.9	34	8.9	0.59	0.26	2.99	0.22

Source: Waller. 2004.