

# 2003 Feed Com

## *The latest data on typical composition of commonly used feeds for cattle and sheep*

Compiled by R.L. Preston, PhD

**A**ccompanying this discussion is a table showing the typical composition of feedstuffs and ingredients commonly used in the feeding of cattle and sheep in North America. Nutrition research spanning more than 100 years has defined the nutrients required by animals. Using this information, diets can be formulated from feedstuffs and ingredients to meet these requirements with the exception that animals will not only remain healthy but will also be productive and efficient.

### Composition Values

Unlike chemicals, which are “chemically pure” and therefore have a constant composition, feeds vary in their composition. Actual analysis of a feed is much more accurate than the use of tabulated composition data. While actual analysis should be obtained and used when possible it’s often either impossible to determine actual composition or there is insufficient time to obtain such analysis. Tabulated data are the next best source of information.

In using tabulated data, remember that feeds vary in their composition. Using the data shown in the accompanying table, you can expect the organic constituents (e.g., crude protein, ether extract, crude fiber, acid detergent fiber and neutral detergent fiber) to vary as much as  $\pm 15\%$ , the mineral constituents to vary as much as  $\pm 30\%$  and the energy values to vary up to  $\pm 10\%$ . Therefore, values shown can only be guides. For this reason they are called “typical values.” They are not averages since judgment was used in arriving at some of the values in the hope these values will be realistic for use in formulating cattle and sheep diets.

New crop varieties usually result in nutrient composition changes. Genetically modified crops will result in

feeds with generally improved nutrient content and availability and/or decreased anti-nutrient factors.

### Chemical Constituents vs. Biological Attributes

Feeds can be chemically analyzed for many things that may or may not be related to the response of an animal when fed the feed. The accompanying table shows certain chemical constituents. The response of cattle and sheep when fed a feed, however, can be termed the biological response to the feed that is a function of its chemical composition and the ability of the animal to derive useful nutrient value from the feed.

The latter relates to the digestibility or availability of a nutrient in the feed for absorption into the body and its ultimate efficiency of use depending upon the nutrient status of the animal and the productive or physiological function

They are more variable than chemical constituents but are generally more predictive, however, since they relate to the response of an animal being fed the feed or diet.

### Source Of Information

Several sources of information were used in arriving at the typical values shown in the table. Where information was not available, a reasonable estimate made from similar feeds or stage of maturity has been used. Where zeros appear, the amount is so small that it can be considered insignificant in practical diet formulation; blanks indicate that the value is unknown.

### Using The Table Information

**Feed names:** Obvious or commonly used feed names are used. Feeds designated as “fresh” are feeds that are grazed or fed as fresh-cut materials.

**Dry matter:** Typical dry matter (DM) values are shown; however, the moisture content of feeds can vary greatly. Therefore, DM content can be the biggest reason for variation in feedstuff composition on an “as-fed basis.” Chemical constituents and biological attributes of feeds shown in the table are on a DM basis.

DM can vary greatly and because one of the factors regulating total feed intake is the DM content of feeds, diet formulation on a DM basis is sounder than using as-fed basis. To convert a value to an as-fed basis, multiply the decimal equivalent of the DM content by the compositional value shown in the table.

**Energy:** Four measures of the energy value of feeds are shown. TDN is shown because there are more determined TDN values for feeds and it has been the standard system for expressing the energy value of feeds for cattle and sheep. There are several technical problems with TDN, however. The digestibility of crude fiber (CF) may be higher than for nitrogen-free extract (NFE) in certain feeds. TDN overestimates the value of roughages compared



being performed by the animal. Ground fence posts and shelled corn may have the same gross energy value but have markedly different useful energy value (TDN or EN) when consumed by the animal.

Biological attributes of a feed have much greater meaning in predicting the productive response of animals but are more difficult and costly to accurately determine. This is due to interaction between the chemical composition of a feed with the digestive and metabolic capabilities of the animal being fed.

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to concentrates in producing animals.

Some have argued that energy is not measured in pounds or percent and therefore TDN is not a valid measure of energy. However, this is more a scientific argument than a criticism of the predictive value of TDN.

**Digestible Energy.** Digestible Energy (DE) values are not included in the table. There is a constant relationship between TDN and DE in cattle and sheep; DE (Mcal/cwt.) can be calculated by multiplying the %TDN content by two.

**Protein:** Crude protein (CP) values are shown for each feed, which are Kjeldahl nitrogen times 100/16 or 6.25, because proteins contain 16% nitrogen on the average. Crude protein does not give any information on the actual protein and non-protein nitrogen content of a feed.

Digestible protein (DP) has been included in many tables of feed composition but because of the contribution of microbial and body protein to the protein in feces, DP is more misleading than CP. One can estimate DP from the CP content of the diet fed to cattle or sheep by the following equation: %DP = 0.9(%CP) - 3 (where %DP and %CP are the diet values on a DM basis.)

Undegradable intake protein (UIP; rumen "by-pass" or escape protein) values represent the percent of CP that passes through the rumen without being

degraded by the rumen microorganisms. Like other biological attributes, these values are not constant.

UIP values on many feeds have not been determined and reasonable estimates are difficult to make. Generally, degradable intake protein (DIP) can supply CP up to 7% of the diet. If the CP required in the diet exceeds 7% of the DM, all CP above this amount should be UIP. In other words, if the final diet is to contain 13% CP, 6 of the 13 percentage units, or 46% of the CP, should be in the form of UIP. Once the relationships between UIP and DIP have been better quantified, CP requirements may be lowered especially at higher CP levels.

**Crude, acid detergent and neutral detergent fiber:** Crude fiber (CF) is declining in popularity as a measure of poorly digestible carbohydrates in feeds. Improved analytical procedures for fiber have been developed, namely acid detergent fiber (ADF) and neutral detergent fiber (NDF). ADF is related to digestibility and NDF is somewhat related to voluntary intake and the availability of net energy. One reason CF remained in the analytical scheme was its apparent requirement for the calculation of TDN.

Recently, effective NDF (eNDF) has been proposed to better describe the dietary fiber function in high concentrate, feedlot-type diets. While eNDF is defined as the percent of NDF that is retained on a screen similar in size to particles that will pass from the rumen, this value is further modified based on feed density and degree of hydration.

Rumen pH is correlated with dietary eNDF when diets contain less than 26% eNDF. When formulating high concentrate diets, including a recommended 5–20% eNDF will help to prevent acidosis in the rumen. Estimated eNDF values shown for many feeds must be modified depending on degree of feed processing (eg., chopping, grinding, pelleting) and hydration (fresh forage, silages, high-moisture grains) if these feed forms are

not specified in the table.

**Ether extract:** Ether extract (EE) shows the crude fat content of the feed.

**Minerals:** Values are shown for only certain minerals. Calcium (Ca) and phosphorus (P) are important minerals to consider in most feeding situations. Potassium (K) becomes more important as the level of concentrate increases and when non-protein nitrogen is substituted for intact protein in the diet.

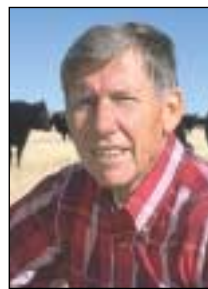
Sulfur (S) also becomes more important as the level of non-protein nitrogen increases in the diet.

Zinc (Zn) is shown because it is less variable and is more generally near a deficient level in cattle and sheep diets.

Chlorine (Cl) is of increasing interest for its role in dietary acid-base relationships.

**Vitamins:** Vitamins have been omitted from the table. The only vitamin of general practical importance in cattle and sheep feeding is the vitamin A value (vitamin A and carotene) in feeds that depends largely on maturity and conditions at harvest, and the length and conditions of storage.

It is probably unwise to rely entirely on harvested feeds as a source of vitamin A value. Roughages that contain good green color or are being fed as immature fresh forages (e.g. pasture), probably contain sufficient vitamin A value to meet the animal's requirement. Other required vitamins should be supplied as supplements.



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## Future Revisions

I welcome suggestions and compositional data to this table. When sending compositional data, please adequately describe the feed, indicate the dry matter or moisture content and whether analytical values are given on an as-fed or DM basis. If more than one sample of a feedstuff was analyzed, the number of samples should be indicated. ♦

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(All values except dry matter are shown on a dry matter basis)

FEEDSTUFF	ENERGY					PROTEIN		FIBER				EE	ASH	CA	P	K	CL	S	ZN	
	DM	TDN	NE <sub>M</sub>	NE <sub>G</sub>	NE <sub>L</sub>	CP	BYPASS	CF	ADF	NDF	eNDF									
	%	%	Mcal/cwt.	%	%	%	%	%	%	%	%									%
Alfalfa Cubes	91	57	57	25	57	18	30	29	36	46	40	2.0	11	1.30	0.23	1.9	0.37	0.35	20	
Alfalfa Dehydrated 17% CP	92	61	62	31	61	19	60	26	34	45	6	3.0	11	1.42	0.25	2.5	0.45	0.24	21	
Alfalfa Fresh	24	61	62	31	61	19	18	27	34	46	41	3.0	9	1.35	0.27	2.6	0.40	0.28	18	
Alfalfa Hay Early Bloom	90	59	59	28	59	19	20	28	35	45	92	2.5	8	1.41	0.26	2.5	0.38	0.27	22	
Alfalfa Hay Full Bloom	88	54	54	20	54	16	25	34	40	52	92	2.0	8	1.20	0.23	1.7	0.37	0.23	23	
Alfalfa Hay Mature	88	50	50	12	49	13	30	38	45	59	92	1.3	8	1.18	0.19	1.5	0.35	0.20	23	
Alfalfa Hay Midbloom	89	58	58	26	58	17	23	30	36	47	92	2.3	9	1.40	0.24	2.0	0.38	0.26	24	
Alfalfa Leaf Meal	89	69	71	43	70	28	15	15	25	34	35	2.7	15	2.88	0.34	2.2		0.32	39	
Alfalfa Seed Screenings	91	84	92	61	87	34		13	15			10.5	6	0.30	0.67					
Alfalfa Silage	30	55	55	21	55	18	19	28	37	49	82	3.0	9	1.40	0.29	2.6	0.41	0.29	26	
Alfalfa Silage Wilted	39	58	58	26	58	18	22	28	37	49	82	3.0	9	1.40	0.29	2.6	0.41	0.29	26	
Alfalfa Stems	89	47	47	7	46	11	44	44	51	68	100	1.3	6	0.90	0.18	2.5				
Almond Hulls	89	59	59	28	59	5	60	16	27	35	100	3.3	7	0.25	0.10	2.0	0.03	0.07	20	
Ammonium Chloride	99	0	0	0	0	163	0	0	0	0	0	0.0		0.00	0.00	0.0	66.00	0.00	0	
Ammonium Sulfate	99	0	0	0	0	132	0	0	0	0	0	0.0						24.15		
Apple Pomace Dried	89	65	66	37	66	5	15	19	35	45	34	5.2	4	0.13	0.12	0.5		0.02		
Apple Pomace Wet	20	68	70	41	69	6	10	17	34	40	34	5.6	4	0.14	0.14	0.6		0.06	11	
Artichoke Tops (Jerusalem)	27	61	62	31	61	6		18	30	41	40	1.1	10	1.62	0.11	1.4				
Avocado Seed Meal	91	52	52	16	51	20		19	24			1.2	16							
Bahiagrass Hay	90	51	51	14	50	8	37	32	41	72	98	1.9	8	0.48	0.20	1.4		0.21		
Bakery Product Dried	90	90	100	68	94	12	30	4	6	14	0	11.0	4	0.18	0.28	0.3	2.25	0.15	33	
Barley Feed																				
Pearl Byproduct	90	73	77	48	75	15		12	15			3.9	5	0.05	0.45	0.7		0.06		
Barley Grain	89	84	92	61	87	12	28	5	7	19	34	2.1	3	0.06	0.38	0.6	0.18	0.16	23	
Barley Grain 2-row	87	84	92	61	87	12		6	8	24	34	2.3	2	0.05	0.31	0.6	0.18	0.17		
Barley Grain 6-row	87	84	92	61	87	11		6	8	24	34	2.2	3	0.05	0.36	0.6	0.18	0.15		
Barley Hay	90	57	57	25	57	9		28	37	65	98	2.1	8	0.30	0.28	1.6		0.19	25	
Barley Grain Screenings	89	77	82	53	79	12		9	11			2.6	4	0.30	0.33	0.7		0.15		
Barley Grain																				
Steam Flaked	85	90	100	70	100	12	39	5	7	19	30	2.1	3	0.06	0.35	0.6	0.18	0.16	23.00	
Barley Grain																				
Steam Rolled	86	84	92	61	87	12	38	5	7	19	27	2.1	3	0.06	0.41	0.6	0.18	0.17	30	
Barley Grain																				
Lt. Wt. (42-44 lb./bu.)	88	78	83	54	80	13	30	9	12	30	34	2.3	4							
Barley Silage	35	59	58	26	58	12	22	34	37	58	61	3.0	9	0.46	0.30	2.4		0.22	28	
Barley Silage Mature	35	58	58	26	58	12	25	30	34	50	61	3.5	9	0.30	0.20	1.5		0.15	25	
Barley Straw	90	43	44	0	42	4	70	42	52	78	100	1.9	7	0.33	0.08	2.1	0.67	0.16	7	
Beans Navy Cull	90	84	92	61	87	24	25	5	8	20	0	1.4	5	0.15	0.59	1.4	0.06	0.26	45	
Beet Pulp Dried	91	75	79	50	77	11	44	21	21	41	33	0.7	6	0.65	0.08	1.4	0.40	0.22	22	
Beet Pulp Dried																				
With Molasses	92	76	81	52	78	11	34	17	22	40	33	0.6	6	0.60	0.10	1.8		0.42	11	
Beet Pulp Wet	17	76	81	52	78	11	35	20	23	48	33	0.7	6	0.68	0.08	1.4	0.40	0.21	20	
Beet Pulp Wet																				
With Molasses	24	77	82	53	79	11	25	16	21	39	33	0.6	6	0.60	0.10	1.8		0.42	11	
Beet Top Silage	25	52	52	16	51	12		12				2.0	32	1.38	0.22	5.7		0.57	20	
Beet Tops (Sugar)	20	58	58	26	58	14		10	14	25	41	1.5	24	1.20	0.23	5.1	0.20	0.45	20	
Bermuda Grass Coastal Dehydrated	90	62	63	33	63	16	40	26	29	40	10	3.8	7	0.40	0.25	1.8		0.23	18	
Bermuda Grass																				
Coastal Hay	89	56	56	23	56	10	20	30	36	73	98	2.1	6	0.47	0.21	1.5		0.22	16	
Bermuda Grass Hay	89	53	53	18	53	10	18	30	39	78	98	1.9	8	0.46	0.20	1.5		0.25	33	
Bermuda Grass Silage	26	50	50	12	49	10	15	30	37	77	48	1.9	8	0.46	0.20	1.5		0.25	33	
Birds-Foot Trefoil Fresh	22	66	68	38	67	21	20	21	31	47	41	4.4	9	1.78	0.25	2.6		0.25	31	
Birds-Foot Trefoil Hay	89	57	57	25	57	16	22	31	38	50	92	2.2	8	1.73	0.24	1.8		0.25	28	
Biuret	99	0	0	0	0	248	0	0	0	0	0	0.0	0	0.00	0.00	0.0	0.00	0.00	0	
Blood Meal	91	66	68	38	67	92	80	1	2	10	0	1.4	3	0.32	0.28	0.2	0.30	0.70	22	
Bluegrass KY Fresh																				
Early Bloom	36	69	71	43	70	15	20	27	32	60	41	3.9	7	0.37	0.30	1.9	0.42	0.19	25	
Bluegrass Straw	93	45	45	3	44	6		40	50	78	90	1.1	6	0.20	0.10					
Bluestem Fresh Mature	61	50	50	12	49	6		34				2.5	5	0.40	0.12	0.8		0.05	28	
Bone Meal Steamed	95	16	27	0	11	13		1	0	0	0	11.6	77	27.00	12.74	0.2		2.50	290	
Bread Byproduct	68	91	102	69	95	14	24	1	2	3	0	3.2	3	0.09	0.18	0.8	0.2	0.76	0.15	40
Brewers Grains Dried	92	84	92	61	87	24	54	14	24	50	18	9.2	4	0.29	0.60	0.1	0.15	0.32	78	
Brewers Grains Wet	23	85	93	62	88	26	52	13	21	44	18	7.6	4	0.29	0.61	0.1	0.15	0.32	78	
Brewers Yeast Dried	94	79	85	55	81	48		3				1.0	7	0.10	1.56	1.8		0.41	41	
Bromegrass																				
Fresh Immature	30	64	65	36	65	15	22	28	33	54	40	4.1	10	0.45	0.34	2.3		0.21	20	
Bromegrass Hay	89	55	55	21	55	10	33	35	41	66	98	2.3	9	0.40	0.23	1.9	0.40	0.18	19	
Bromegrass Haylage	35	57	57	25	57	11	26	36	44	69	61	2.5	8	0.38	0.30	2.0		0.20	19	
Buckwheat Grain	88	77	82	53	79	12		12	17			2.8	2	0.11	0.36	0.5	0.05	0.16	10	
Buttermilk Dried	92	88	98	65	91	34	0	5	0	0	0	5.0	10	1.44	1.00	0.9		0.09	44	
Cactus	26	63	64	34	64	5		18	23	29		2.1	17	3.50	0.10	1.7		0.20		
Calcium Carbonate	99	0	0	0	0	0		0	0	0	0	0.0	99	38.50	0.04	0.1		0.00	0	
Canarygrass Hay	91	53	53	18	53	9	26	32	34	67	98	2.7	8	0.38	0.25	2.7		0.14	18	
Canola Meal Solvent	90	71	74	46	73	40	30	12	20	29	23	4.0	8	0.75	1.16	1.3	0.07	0.78	68	
Carrot Pulp	14	62	63	33	63	6		19	23	40	0	7.8	9							

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FEEDSTUFF	ENERGY					PROTEIN		FIBER				EE	ASH	CA	P	K	CL	S	ZN
	DM	TDN	NE <sub>M</sub>	NE <sub>G</sub>	NE <sub>L</sub>	CP	BYPASS	CF	ADF	NDF	eNDF								
	%	%	Mcal/cwt.			%	%	%	%	%	%								
Carrot Root Fresh	12	83	90	60	86	10		9	11	20	0	1.4	10	0.60	0.30	2.4	0.50	0.17	
Carrot Tops	16	73	77	48	75	13		18	23	45	41	3.8	15	1.94	0.19	1.9			
Cattle Manure Dried	92	38	40	0	36	17		34	37	55	0	2.6	14	1.35	1.00	0.6		1.78	240
Cheatgrass																			
Fresh Immature	21	68	70	41	69	16		23				2.7	10	0.60	0.28				
Citrus Pulp Dried	90	79	85	55	81	7	38	13	18	21	33	2.2	7	1.81	0.12	0.8	0.04	0.08	14
Clover Ladino Fresh	19	69	71	43	70	25	20	14	33	35	41	4.8	11	1.27	0.38	2.4		0.20	20
Clover Ladino Hay	90	61	62	31	61	21	25	22	32	36	92	2.0	9	1.35	0.32	2.4	0.30	0.20	17
Clover Red Fresh	24	64	65	36	65	18	21	24	33	44	41	4.0	9	1.70	0.30	2.0	0.60	0.17	23
Clover Red Hay	88	55	55	21	55	15	28	30	39	51	92	2.5	8	1.50	0.25	1.7	0.32	0.17	17
Clover Sweet Hay	91	53	53	18	53	16	30	30	38	50	92	2.4	9	1.27	0.25	1.8	0.37	0.46	
Coconut Meal	92	71	74	46	73	21	56	12	22	56	23	6.7	7	0.63	0.21	0.6	0.33	0.04	
Coffee Grounds	88	20	36	0	16	13		41	68	77	10	15.0	2	0.10	0.08				
Corn And Cob Meal	87	82	89	59	85	9	52	9	10	26	56	3.7	2	0.06	0.28	0.5	0.05	0.13	16
Corn Bran	91	76	81	52	78	11		10	17	51	0	6.3	3	0.04	0.15	0.1	0.13	0.08	18
Corn Cannery Waste	29	68	70	41	69	8	15	28	36	59	0	3.0	5	0.10	0.29	1.0		0.13	25
Corn Cobs	90	48	48	9	47	3	50	36	39	88	56	0.5	2	0.12	0.04	0.8		0.40	5
Corn Fodder	80	67	69	40	68	9	45	25	29	48	100	2.4	7	0.50	0.25	0.9	0.20	0.14	
Corn Gluten Feed	90	80	86	56	83	22	25	9	12	40	36	3.2	7	0.12	0.85	1.3	0.25	0.33	84
Corn Gluten																			
Meal 41% CP	91	85	93	62	88	46	58	5	9	32	23	3.2	3	0.13	0.55	0.2	0.07	0.55	35
Corn Gluten																			
Meal 60% CP	91	89	99	67	93	67	60	4	6	11	23	2.6	3	0.06	0.54	0.2	0.10	0.82	40
Corn Grain High Moisture	74	93	104	71	97	10	42	2	3	9	0	4.0	2	0.02	0.30	0.4	0.06	0.13	20
Corn Grain High Oil	88	91	102	69	95	8	54	2	3	8	60	6.9	2	0.01	0.30	0.3	0.05	0.13	18
Corn Grain Hi-Lysine	92	87	96	64	90	12	58	4	4	11	60	4.4	2	0.03	0.24	0.4	0.05	0.11	18
Corn Grain Rolled	88	88	98	65	91	9	54	2	3	9	34	4.3	2	0.02	0.30	0.4	0.05	0.12	18
Corn Grain Steam Flaked	85	93	104	71	97	9	59	2	3	9	40	4.1	2	0.02	0.27	0.4	0.05	0.12	18
Corn Grain Whole	88	88	98	65	91	9	58	2	3	9	60	4.3	2	0.02	0.30	0.4	0.05	0.12	18
Corn Screenings	86	91	102	69	95	10	52	3	4	9	20	4.3	2	0.04	0.27	0.4	0.05	0.12	16
Corn Silage																			
Mature Well Eared	34	72	75	47	74	8	28	21	27	46	70	3.1	5	0.28	0.23	1.1	0.20	0.12	22
Corn Silage Milk Stage	26	65	66	37	66	8	18	26	32	54	60	2.8	6	0.40	0.27	1.6		0.11	20
Corn Silage Sweet Corn	24	65	66	37	66	11		20	32	57	60	5.0	5	0.24	0.26	1.2	0.17	0.16	39
Corn Stover																			
Mature (Stalks)	80	59	59	28	59	5	30	35	44	70	100	1.3	7	0.35	0.19	1.1	0.30	0.14	22
Corn Whole																			
Plant Pelleted	91	63	64	34	64	9	45	21	24	40	6	2.4	6	0.50	0.24	0.9		0.14	
Cotton Gin Trash (Burrs)	91	42	43	0	40	10		34	51	70	100	2.0	14	1.70	0.25	1.9		0.14	25
Cottonseed Hulls	90	45	45	3	44	5	45	48	68	87	100	1.9	3	0.15	0.08	1.1	0.02	0.05	10
Cottonseed Meal																			
Mech. 41% CP	92	80	86	56	83	46	50	13	18	31	23	5.0	7	0.21	1.19	1.7	0.05	0.42	64
Cottonseed Meal																			
Solvent 41% CP	90	77	82	53	79	48	42	13	17	25	23	1.8	7	0.22	1.25	1.7	0.05	0.44	66
Cottonseed Whole	91	95	107	73	99	23	38	29	39	47	100	17.8	4	0.14	0.64	1.1	0.06	0.24	34
Cottonseed																			
Whole Delinted	90	95	107	73	99	24	39	20	29	40	100	22.2	4	0.13	0.55	1.2		0.24	36
Cottonseed																			
Whole Extruded	92	87	98	67	91	26	50	32	44	53	33	9.5	5	0.17	0.68	1.3		0.24	38
Crab Waste Meal	91	29	37	0	30	32	65	11	13			3.0	43	15.00	1.88	0.5	1.63	0.27	107
Crambe Meal Mech.	92	88	98	65	91	28	50	24	33	42	25	17.0	7	1.22	0.78	1.0	0.65	1.18	41
Crambe Meal Solvent	91	81	88	58	84	31	45	25	35	47	23	1.4	8	1.27	0.86	1.1	0.70	1.26	44
Cranberry Pulp Meal	88	49	49	11	48	7		26	47	54	33	15.7	2						
Crawfish Waste Meal	94	25	36	0	29	35	74		15				42	13.10	0.85				
Curacao Phosphate	99	0	0	0	0	0		0	0	0	0	0.0	95	34.00	15.00				
Defluorinated Phosphate	99	0	0	0	0	0		0	0	0	0	0.0	95	32.60	18.07	1.0			100
Diammonium Phosphate	98	0	0	0	0	115	0	0	0	0	0	0.0	35	0.52	20.41	0.0		2.16	
Dicalcium Phosphate	96	0	0	0	0	0		0	0	0	0	0.0	94	22.00	18.65	0.1		1.00	70
Distillers Corn Stillage	7	92	103	70	96	22	55	8	10	21	0	8.1	5	0.14	0.72	0.2		0.60	60
Distillers Dried Solubles	93	88	98	65	91	29	0	4	7	22	4	9.2	7	0.33	1.38	1.8	0.28	0.40	91
Distillers Grain Barley	90	77	82	53	79	30	56	18	22	45	4	3.7	4	0.15	0.67	1.0	0.18	0.43	50
Distillers Grain Corn Dry	91	95	107	73	99	29	60	8	21	44	4	10.5	4	0.15	0.78	0.9	0.14	0.45	65
Distillers Grain Corn Wet	36	95	107	73	99	29	55	8	21	43	4	10.5	4	0.15	0.78	0.9	0.14	0.45	65
Distillers Grain																			
Corn With Solubles	90	92	103	70	96	29	50	9	17	43	4	10.6	6	0.28	0.79	1.0	0.18	0.39	80
Distillers Grain																			
Sorghum Dry	91	87	96	64	90	32	62	13	22	44	4	10.0	3	0.22	0.63	0.3		0.45	50
Distillers Grain																			
Sorghum Wet	35	87	96	64	90	32	55	13	22	44	4	10.0	3	0.22	0.63	0.3		0.45	50
Distillers Grain Sorghum																			
With Solubles	92	85	93	62	88	31	53	13	19	47	4	10.0	3	0.25	0.65	0.5		0.40	55
Distillers Grain Wet	25	90	100	68	94	28	52	8	18	40	4	9.6	6	0.28	0.78	1.2	0.28	0.40	95
Elephant (Napier) grass																			
hay chopped	92	55	55	21	54	9		24	46	63	85	2.0	10	0.35	0.30	1.3		0.10	
Fat Animal Poultry																			
Vegetable	99	195	285	230	285	0		0	0	0	0	99.0	0	0.00	0.00	0.0			
Feather Meal Hydrolyzed	92	69	71	43	70	86	73	2	16	44	23	6.5	4	0.60	0.62	0.2	0.30	1.85	95
Fescue KY 31 Fresh	29	64	65	36	65	15	20	25	32	64	40	5.5	9	0.48	0.37	2.5		0.18	22
Fescue KY 31																			
Hay Early Bloom	88	65	66	37	66	18	22	25	31	64	98	6.6	8	0.45	0.37	2.7		0.24	24

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FEEDSTUFF	ENERGY					PROTEIN		FIBER				EE	ASH	CA	P	K	CL	S	ZN
	DM	TDN	NE <sub>M</sub>	NE <sub>G</sub>	NE <sub>L</sub>	CP	BYPASS	CF	ADF	NDF	eNDF								
	%	%	Mcal/cwt.			%	%	%	%	%	%								
Fescue KY 31 Hay Mature	88	52	52	16	51	11	30	30	42	73	98	5.0	6	0.45	0.26	1.7		0.14	22
Fescue (Red) Straw	94	43	44	0	41	4		41				1.1	6	0.00	0.06				
Fish Meal	90	74	78	49	76	66	60	1	2	12	10	8.0	20	5.50	3.15	0.7	0.76	0.80	130
Garbage Municipal																			
Cooked	23	80	86	56	83	16		9	50	59	30	20.0	10	1.20	0.43	0.6	0.67		
Grain Dust	92	73	77	48	75	10		11				2.2	10	0.30	0.18				42
Grain Screenings	90	65	66	37	66	14		14				5.5	9	0.25	0.34				30
Grape Pomace Stemless	91	30	38	0	27	12	45	32	48	53	34	7.5	9	0.50	0.08	0.5	0.01		24
Grass Hay	88	58	58	26	58	10	30	33	41	63	98	3.0	6	0.60	0.21	2.0		0.20	28
Grass Silage	30	61	62	31	61	11	24	32	39	60	61	3.4	8	0.70	0.24	2.1		0.22	29
Guar Meal	90	72	75	47	74	39	34	16				3.9	5						
Hominy Feed	90	89	99	67	93	11	48	5	7	21	9	6.1	3	0.04	0.54	0.6	0.06	0.10	32
Hop Leaves	37	49	49	11	48	15		15				3.6	35	2.80	0.64				
Hop Vine Silage	30	53	53	18	53	15		21	24			3.1	20	3.30	0.37	1.8		0.22	44
Hops Spent	89	37	40	0	35	23		26	30			4.5	7	1.60	0.60				
Kelp Dried	91	32	38	0	29	7		7	10			0.5	39	2.72	0.31				
Kenaf Hay	92	48	48	9	47	10		31	44	56	98	2.9	12						
Kochia Fresh	29	55	55	21	55	16		23				1.2	18	1.10	0.30				
Kochia Hay	90	53	53	18	53	14		27				1.7	14	1.00	0.20				
Kudzu Hay	90	54	54	20	54	16		33				2.6	7	3.00	0.23				
Lespedeza Fresh																			
Early Bloom	25	60	60	30	60	16	50	32				2.0	10	1.20	0.24	1.1		0.21	
Lespedeza Hay	92	54	54	20	54	14	60	30				3.0	7	1.10	0.22	1.0		0.19	29
Limestone																			
Dolomitic Ground	99	0	0	0	0	0	0	0	0	0	0	0.0	98	22.30	0.04	0.4			
Limestone Ground	98	0	0	0	0	0	0	0	0	0	0	0.0	98	34.00	0.02			0.03	
Linseed Meal Solvent	91	76	81	52	78	39	36	10	18	25	23	1.9	6	0.43	0.93	1.5	0.04	0.47	60
Meadow Hay	90	50	50	12	49	7	23	33	44	70	98	2.5	9	0.61	0.18	1.6		0.17	24
Meat Meal	93	71	74	46	73	56	64	2	7	48	0	10.5	24	9.00	4.42	0.5	1.27	0.48	190
Meat And Bone Meal	93	71	74	46	73	56	51	2	6	35	0	10.4	32	10.00	5.00	1.0	0.80	0.40	96
Porcine/Poultry	93	72	75	47	74	56	24	1	5	34	0	10.0	29	13.50	6.50				
Milk, Dry, Skim	94	87	96	64	90	36	0	0	0	0	0	1.0	8.4	1.36	1.09	1.7	0.96	0.34	41
Mint Slug Silage	27	55	55	21	55	14		24				1.8	16	1.10	0.57				
Molasses Beet	77	75	79	50	77	9	0	0	0	0	0	0.2	12	0.12	0.03	6.0	1.64	0.60	18
Molasses Cane	76	75	79	50	77	6	0	0	0	0	0	0.8	12	0.97	0.10	3.7	2.50	0.55	25
Molasses Cane Dried	94	74	78	49	76	9	0	2	3	7	0	0.3	14	1.10	0.15	3.6	3.00	0.47	30
Molasses Citrus	65	77	82	53	79	10	0	0	0	0	0	0.3	8	1.90	0.17	0.2	0.11	0.23	137
Molasses Cond.																			
Fermentation Solubles	46					80									0.25			12.60	
Molasses Wood																			
Hemicellulose	61	76	81	52	78	1	0	1	2	4	0	0.7	9	1.30	0.09	0.1		0.05	
Monoammonium																			
Phosphate	98	0	0	0	0	70	0	0	0	0	0	0.0	24	0.30	24.70	0.0		1.42	81
Mono-Dicalcium																			
Phosphate	97	0	0	0	0	0		0	0	0	0	0.0	94	16.70	21.10	0.1		1.20	70
Oat Grain	89	76	81	52	78	13	18	11	15	28	34	5.0	4	0.05	0.41	0.5	0.11	0.20	40
Oat Grain Steam Flaked	84	88	98	65	91	13	26	11	15	30	32	4.9	4	0.05	0.37	0.5	0.11	0.20	40.00
Oat Groats	91	91	102	69	95	18	15	3				6.6	2	0.08	0.47	0.4	0.10	0.20	
Oat Hay	90	54	54	20	54	10	25	31	39	63	98	2.3	8	0.40	0.27	1.6	0.42	0.21	28
Oat Hulls	93	40	42	0	38	4	25	32	40	75	90	1.5	7	0.16	0.15	0.6	0.08	0.14	31
Oat Middlings	90	90	100	68	94	17	20	3	4			6.0	3	0.06	0.48	0.5		0.23	
Oat Mill Byproduct	89	33	38	0	30	8		25	37			2.6	6	0.12	0.23	0.6		0.24	
Oat Silage	35	60	60	30	60	12	21	31	39	59	61	3.2	10	0.34	0.30	2.4	0.50	0.25	27
Oat Straw	91	48	48	9	47	4	40	41	48	73	98	2.3	8	0.24	0.07	2.4	0.78	0.22	6
Orange Pulp Dried	89	80	86	56	83	9		9	16	20	33	1.8	4	0.71	0.11	0.6		0.05	
Orchardgrass Fresh																			
Early Bloom	24	65	66	37	66	14	23	30	32	54	41	4.0	9	0.33	0.39	2.7	0.08	0.20	21
Orchardgrass Hay	88	59	59	28	59	10	27	34	40	67	98	3.3	8	0.32	0.30	2.6	0.41	0.20	26
Pea Straw	89	50	50	12	49	7		42	49	72	98	1.3	7	0.60	0.15	1.1		0.15	
Pea Vine Hay	89	60	60	30	60	10		32	52	62	92	1.8	7	1.20	0.21	1.2		0.20	20
Pea Vine Silage	25	58	58	26	58	16		29	44	55	61	3.3	8	1.25	0.28	1.6		0.29	32
Peas Cull	89	86	95	63	89	25	22	7	9	15	0	1.5	4	0.15	0.45	1.1	0.06	0.26	30
Peanut Hulls	91	22	36	0	18	7		63	65	74	98	1.5	5	0.20	0.07	0.9			
Peanut Meal Solvent	91	77	82	53	79	50	27	8	15	27	23	3.6	6	0.24	0.58	1.0	0.03	0.30	38
Peanut Skins	92	0	0	0	0	17		13	20	28	0	22.0	3	0.19	0.20				
Pearl Millet Grain	87	82	89	59	85	13		2	6	18	34	4.5	3	0.03	0.36	0.5			
Pineapple Bran	89	71	74	46	73	5		19	31	66	20	1.5	3	0.26	0.12				
Pineapple Greenchop	17	45	45	3	44	8		23	35	64	41	2.6	7	0.28	0.08				
Pineapple Presscake	21	72	75	47	74	5		23	35	69	20	0.9	3	0.24	0.10				
Potato Vine Silage	15	59	59	28	59	15		26				3.7	19	2.10	0.29	4.0		0.37	
Potato Waste Dried	89	85	93	62	88	8	0	7	9	12	0	0.5	5	0.16	0.25	1.2	0.39	0.11	12
Potato Waste Filter Cake	14	77	82	53	79	5	0	2				7.7	3	0.10	0.19	0.2			
Potato Waste Wet	14	82	89	59	85	7	0	9	11	15	0	1.5	3	0.16	0.25	1.2	0.36	0.11	12
Potato Waste Wet																			
With Lime	17	80	86	56	83	5	0	10	12	16	0	0.3	9	4.20	0.18				
Potatoes Cull	21	80	86	56	83	10	0	2	3	4	0	0.4	5	0.03	0.24	2.2	0.30	0.09	
Poultry By-Product Meal	93	79	85	55	81	62	49	2				14.5	17	4.00	2.25	0.5	0.58	0.56	129
Poultry Litter Dried	87	64	65	36	65	25	0	18				3.0	19	3.00	2.05	2.3		0.85	440
Poultry Manure Dried	89	38	40	0	36	28	22	13	15	35	0	2.1	33	10.20	2.80	2.3	1.05	0.20	520

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FEEDSTUFF	ENERGY					PROTEIN		FIBER				EE	ASH	CA	P	K	CL	S	ZN
	DM	TDN	NE <sub>M</sub>	NE <sub>G</sub>	NE <sub>L</sub>	CP	BYPASS	CF	ADF	NDF	eNDF								
	%	%	Mcal/cwt.	%	%	%	%	%	%	%	%								
Prairie Hay	91	50	50	12	49	7	37	34	47	67	98	2.0	8	0.40	0.15	1.1	0.06	0.06	34
Pumpkins Cull	10	85	93	62	88	16		14	18	25	0	8.9	9	0.24	0.43	3.3			
Rice Bran	91	72	75	47	74	14	30	13	18	23	0	19.0	11	0.07	1.70	1.8	0.09	0.19	40
Rice Grain	89	79	85	55	81	8	30	10	12	16	34	1.9	5	0.07	0.32	0.4	0.09	0.05	17
Rice Hulls	92	13	35	0	8	3	45	44	70	81	90	0.9	20	0.14	0.07	0.5	0.08	0.08	24
Rice Mill Byproduct	91	42	43	0	40	7		32	48	60	0	5.7		0.40	0.31	2.2		0.30	31
Rice Polishings	90	90	100	68	94	14		4	5			14.0	9	0.05	1.36	1.2	0.12	0.19	28
Rice Straw	91	40	42	0	38	4		40	55	72	100	1.4	12	0.25	0.08	1.1		0.11	
Rice Straw Ammoniated	87	45	45	3	44	9		39	53	68	100	1.3	12	0.25	0.08	1.1		0.11	
Rye Grain	89	82	89	59	85	12	20	2	9	19	34	1.7	2	0.07	0.39	0.5	0.03	0.17	33
Rye Grass Hay	90	58	58	26	58	10	30	33	38	65	98	3.3	8	0.45	0.30	2.2		0.18	27
Rye Grass Silage	32	59	59	28	59	14	25	22	37	59	61	3.3	8	0.43	0.38	2.9	0.73	0.23	29
Rye Straw	89	44	44	1	43	4		44	55	71	100	1.5	6	0.24	0.09	1.0	0.24	0.11	
Safflower Meal																			
Dehulled Solvent	91	76	81	52	78	48		9				0.6	7	0.38	1.60	1.2	0.18	0.22	36
Safflower Meal Solvent	91	55	55	21	55	24		33	41	57	36	1.2	6	0.35	0.78	1.0	0.21	0.23	65
Sagebrush Fresh	50	50	50	12	49	13		25	28	36		9.2	10	1.00	0.25			0.22	
Sanfoin Hay	88	61	62	31	62	14	60	24				3.1	9						
Shrimp Waste Meal	90	48	48	9	47	50	60	11				5.5	25	8.50	1.75		1.15		
Sodium Tripolyphosphate	96	0	0	0	0	0		0	0	0	0	0.0	96	0.00	25.98	0.0		0.00	
Sorghum Grain																			
(Milo) Flaked	82	90	100	68	94	11	62	3	6	20	38	3.1	2	0.04	0.28	0.4	0.10	0.14	18
Sorghum Grain																			
(Milo) Ground	89	82	89	59	85	11	55	3	6	16	5	3.1	2	0.04	0.32	0.4	0.10	0.14	18
Sorghum Silage	32	59	59	28	59	9	30	27	38	59	70	2.7	6	0.48	0.21	1.7	0.45	0.11	30
Sorghum Stover	87	55	55	21	55	5		33	41	65	100	1.9	10	0.49	0.12	1.2			
Soybean Hay	89	52	52	16	51	15		35	40	55	92	2.2	8	1.29	0.30	1.1	0.15	0.24	24
Soybean Hulls	90	77	82	52	79	12	28	38	46	64	28	2.6	5	0.55	0.17	1.4	0.02	0.12	38
Soybean Meal																			
Solvent 44% CP	91	84	92	61	87	49	35	6	10	15	23	1.6	7	0.38	0.71	2.3	0.07	0.43	62
Soybean Meal																			
Solvent 49% CP	91	87	96	64	90	54	36	3	6	9	23	1.2	6	0.28	0.71	2.2	0.08	0.47	61
Soybean Mill Feed	90	51	51	14	50	15		36	46			2.0	6	0.49	0.18	1.7		0.07	
Soybean Straw	88	42	43	0	40	5		44	54	70	100	1.4	6	1.59	0.06	0.6		0.26	
Soybeans Whole	88	93	104	71	97	40	28	9	11	15	100	18.8	5	0.27	0.64	2.0	0.03	0.34	56
Soybeans Whole Extruded	88	93	104	71	97	40	35	9	11	15	100	18.8	5	0.27	0.64	2.0	0.03	0.34	56
Soybeans Whole Roasted	88	93	104	71	97	40	38	9	11	15	100	18.8	5	0.27	0.64	2.0	0.03	0.34	56
Spelt Grain	88	75	79	50	77	13	27	10	17	21	34	2.1	4	0.04	0.40	0.4		0.15	47
Sudan Grass																			
Fresh Immature	18	70	73	44	71	17		23	29	55	41	3.9	9	0.46	0.36	2.0		0.11	24
Sudan Grass Hay	88	57	57	25	57	9	30	36	43	67	98	1.8	10	0.50	0.22	2.2	0.80	0.12	26
Sudan Grass Silage	31	58	58	26	58	10	28	30	42	64	61	3.1	10	0.58	0.27	2.4	0.52	0.14	29
Sunflower Seed Hulls	90	40	42	0	38	4	65	52	63	73	90	2.2	3	0.00	0.11	0.2		0.19	200
Sunflower Seed																			
Meal Solvent	92	65	66	37	66	38	27	20	24	36	23	2.5	8	0.44	0.97	1.2	0.15	0.33	55
Sunflower Seed																			
Meal With Hulls	91	57	57	25	57	31	35	27	32	44	37	2.4	7	0.40	1.03	1.0		0.30	85
Sugar Cane Bagasse	91	36	39	0	34	1		49	59	86	100	0.7	3	0.90	0.29	0.5		0.10	
Tapioca Meal	89	83	90	60	86	2		5	8	34		0.8	3	0.03	0.05				
Timothy Fresh Pre-bloom	26	64	65	36	65	11	20	31	36	59	41	3.8	7	0.40	0.28	1.9	0.57	0.15	28
Timothy Hay Early Bloom	88	59	59	28	59	11	22	32	39	63	98	2.7	6	0.58	0.26	1.9	0.51	0.21	30
Timothy Hay Full Bloom	88	57	57	25	57	8	30	34	40	65	98	2.6	5	0.43	0.20	1.8	0.62	0.13	25
Timothy Silage	34	59	59	28	59	10	25	34	45	70	61	3.4	7	0.50	0.27	1.7		0.15	
Tomato Pomace Dried	92	64	65	36	65	23		26	50	55	34	10.6	6	0.43	0.59	3.6			
Triticale Grain	89	85	93	62	88	14	25	4	5	22	34	2.4	2	0.07	0.39	0.5		0.17	37
Triticale Hay	90	56	56	23	56	10		34	41	69	98			0.30	0.26	2.3			25
Triticale Silage	34	58	58	26	58	14		30	39	56	61	3.6		0.58	0.34	2.7		0.28	36
Turnip Roots	9	86	95	63	89	12	0	11	34	44	40	1.5	8	0.70	0.34	3.2	0.65	0.43	40
Turnip Tops (Purple)	18	69	71	43	70	16		10	13			2.6	13	3.20	0.31	3.0	1.80	0.27	
Urea 46%N	99	0	0	0	0	288	0	0	0	0	0	0.0	0	0.00	0.00	0.0	0.00	0.00	0
Vetch Hay	89	58	58	26	58	18	14	30	33	48	92	1.8	8	1.25	0.34	2.4		0.13	
Wheat Bran	89	70	73	44	71	17	28	11	13	46	4	4.5	7	0.13	1.29	1.4	0.05	0.24	96
Wheat Fresh Pasture	21	71	74	46	73	20	16	18	30	50	41	4.0	13	0.35	0.36	3.1	0.67	0.22	
Wheat Grain	89	88	98	65	91	14	23	3	4	12	0	2.3	2	0.05	0.43	0.4	0.09	0.15	40
Wheat Grain Hard	89	88	98	65	91	14	28	3	6	14	0	2.0	2	0.05	0.43	0.5		0.16	45
Wheat Grain Soft	89	88	98	65	91	12	23	3	4	12	0	2.0	2	0.06	0.40	0.4		0.15	30
Wheat Grain Sprouted	86	88	98	65	91	12	18	3	4	13	0	2.0	2	0.04	0.36	0.4		0.17	45
Wheat Grain Steam Flaked	85	91	102	69	95	14	29	3	4	12	0	2.3	2	0.05	0.39	0.4		0.15	40
Wheat Hay	90	57	57	25	57	9	25	29	38	66	98	2.0	8	0.21	0.22	1.4	0.50	0.19	23
Wheat Middlings	89	82	89	59	85	19	22	8	12	36	2	4.6	5	0.15	1.02	1.4	0.05	0.21	98
Wheat Mill Run	90	75	79	50	77	17	28	9	12	37	0	4.4	5	0.12	1.00	1.2	0.07	0.22	90
Wheat Shorts	89	80	86	56	83	20	25	7	7	30	0	5.4	5	0.10	0.95	1.1	0.08	0.20	118
Wheat Silage	33	59	59	28	59	12	21	28	37	62	61	3.2	8	0.40	0.28	2.1	0.50	0.21	27
Wheat Straw	91	42	43	0	40	3	60	43	58	81	98	1.8	8	0.16	0.05	1.3	0.32	0.17	6
Wheat Straw Ammoniated	85	50	50	12	49	9	25	40	55	76	98	1.5	9	0.15	0.05	1.3	0.30	0.16	6
Wheat Grass Crested																			
Fresh Early Bloom	37	60	60	30	60	11	25	26	28	50	41	1.6	7	0.46	0.32	2.4			
Wheat Grass Crested																			
Fresh Full Bloom	50	55	55	21	55	10	33	33	36	65	41	1.6	7	0.39	0.28	2.1			
Wheat Grass Crested Hay	92	54	54	20	54	10	33	33	36	65	98	2.4	7	0.33	0.20	2.0			32
Whey Dried	94	82	89	59	85	14	15	0	0	0	0	1.0	9	1.00	0.90	1.4	1.20	0.92	10