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Feed Composition Values

Michigan Beef Production

Michigan State University Extension Service

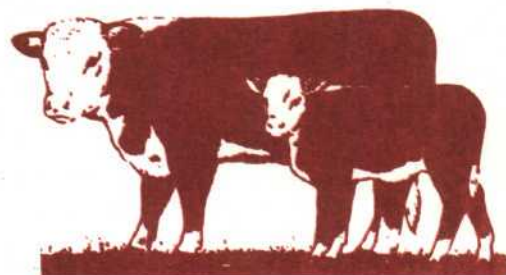
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MICHIGAN BEEF PRODUCTION

COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

Feed Composition Values

This fact sheet summarizes the average nutrient content of feeds available to most beef producers in the midwest and northeast. Nutrient values for an individual feed may vary considerably. For example, total protein as a percent of dry matter for untreated corn silage samples runs from 4.4% to 11%. Feeds—especially corn silage, treated corn silage, and hays—should be tested for protein and moisture.

Average nutrient content values are typically used in the absence of laboratory analysis. The values work reasonably well in most cases, but should be adjusted when actual values are available. Forages are described by factors such as time of harvest and percent grass in alfalfa-grass mixtures to obtain better estimates of nutrient content. The bushel corn/ton of silage and treatment methods are used to categorize corn silages. Grains are described according to test weight.

Energy, protein, calcium, phosphorus, and potassium values for feeds are given in Table 1. Typical dry matter percent values are given. All nutrient values are on a dry matter basis. For example, if 32% dry matter corn silage has a total protein value of 2.56%, then its protein value on a dry matter basis is $(2.56 \div .32) = 8\%$. Energy values are given for two commonly used systems. The total digestible nutrient (TDN) values are provided for those who prefer to use that system. The TDN system works reasonably well for beef cow ration

analysis and formulation. The California Net Energy System (CNE), developed in the 1960's and used widely in most of the cattle feeding areas of the United States, provides an alternative method for ration evaluation and formulation for growing and finishing cattle. Two net energy values are used in this system. The first, net energy for maintenance (NE_m), is used to determine the amount of ration needed to meet the animal's maintenance requirements. The second, net energy for gain (NE_g), is used to calculate the energy available for weight gain after maintenance requirements have been met.

All protein values are stated on a total (crude) basis. Individuals must be careful in use of total protein values since protein quality varies widely among feedstuffs, particularly between corn silage and corn grain. Also, within a particular feedstuff, the method of harvesting and storage has an influence.

The Vitamin A content of general classes of feeds are given in Table 2.

Feeds are coded to insure clarity in communication and to facilitate computerized ration formulation used in some states. For example, 56 lb. test weight corn is Code Number 017 when it is 15% moisture, and Code Number 018 when it is 30% moisture. Also, each nutrient is given a code for reference in computerized ration formulation.

By Harlan D. Ritchie, J. Roy Black and John C. Waller, Animal Science Dept.

TABLE 1. FEED NUTRIENT VALUES (continued)

Feed Specification Code	(2)	(3)	(4)	(6)	(7)	(8)	(11)	(12)		
Feed Description	Feed Code	TDN %	NE _m	NE _g	Total Protein	Calcium	Phos.	Pot.	Dry Matter	Feed Type Code
			Mcal/lb DM	Mcal/lb DM	% of DM	% of DM	% of DM	% of DM	% Usual	
ROUGHAGES:*										
Alfalfa-prebloom, hay	150	63	.71	.40	19.4	1.25	.30	2.10	90	3
haylage	151	63	.71	.40	19.4	1.25	.30	2.10	60	3
haylage	152	63	.71	.40	19.4	1.25	.30	2.10	50	3
silage	153	63	.71	.40	19.4	1.25	.30	2.10	30	3
Alfalfa, early bloom, hay	154	61	.57	.27	18.4	1.25	.23	2.10	90	3
haylage	155	61	.57	.27	18.4	1.25	.23	2.10	60	3
haylage	156	61	.57	.27	18.4	1.25	.23	2.10	50	3
silage	157	61	.57	.27	18.4	1.25	.23	2.10	30	3
Alfalfa, medium, hay	158	58	.51	.18	17.1	1.25	.22	1.35	90	3
haylage	159	58	.51	.18	17.1	1.25	.22	1.35	60	3
haylage	160	58	.51	.18	17.1	1.25	.22	1.35	50	3
silage	161	58	.51	.18	17.1	1.25	.22	1.35	30	3
Alfalfa, mature, hay	162	50	.45	.15	13.6	.56	.20	1.55	90	3
haylage	163	50	.45	.15	13.6	.56	.20	1.55	60	3
haylage	164	50	.45	.15	13.6	.56	.20	1.55	50	3
silage	165	50	.45	.15	13.6	.56	.20	1.55	30	3
Alfalfa, weather damaged, hay	166	55	.51	.18	10.0	.90	.21	1.25	90	3
haylage	167	55	.51	.18	10.0	.90	.21	1.25	60	3
Alfalfa, pasture	168	61	.60	.33	19.4	1.25	.30	2.10	20	3
Alfalfa-brome, early bloom										
hay	169	58	.57	.25	16.0	1.30	.36	3.86	90	3
haylage	170	58	.57	.25	16.0	1.30	.36	3.86	60	3
haylage	171	58	.57	.25	16.0	1.30	.36	3.86	50	3
silage	172	58	.57	.25	16.0	1.30	.36	3.86	30	3
Alfalfa-brome, medium, hay	173	55	.54	.23	13.0	1.00	.23	1.50	90	3
haylage	174	55	.54	.23	13.0	1.00	.23	1.50	60	3
haylage	175	55	.54	.23	13.0	1.00	.23	1.50	50	3
silage	176	55	.54	.23	13.0	1.00	.23	1.50	30	3
Alfalfa-brome, mature, hay	177	50	.45	.15	10.0	.56	.20	1.00	90	3
haylage	178	50	.45	.15	10.0	.56	.20	1.00	60	3
haylage	179	50	.45	.15	10.0	.56	.20	1.00	50	3
silage	180	50	.45	.15	10.0	.56	.20	1.00	30	3
Alfalfa-brome, pasture	181	61	.61	.34	19.5	1.52	.36	3.86	20	3
Apple pomace (25% rice hulls)	186	54	.53	.22	4.5	.13	.11	.47	30	3
Barley straw	187	41	.40	.05	4.1	.30	.05	2.28	90	3
Beet top silage	188	47	.47	.20	12.0	1.00	.22	1.80	20	3
Birdsfoot trefoil hay	190	61	.59	.31	15.5	1.75	.21	2.20	90	3
Bluegrass, early cut, hay	191	65	.64	.37	11.6	.30	.29	1.59	90	3
Bluegrass pasture	192	70	.70	.45	16.0	.50	.39	2.01	20	3
Brome, early cut, hay	193	57	.57	.25	11.8	.40	.30	2.20	90	3
late cut, hay	194	50	.45	.15	6.3	.31	.14	2.00	90	3
pasture	195	68	.69	.43	20.3	.59	.37	4.30	20	3
Clover hay	196	58	.56	.27	14.8	1.61	.22	1.75	90	3
Corn cobs	199	47	.49	.11	2.8	.12	.04	.84	90	3
Corn silage, 6.7 bu corn/ton										
without NPN	200	75	.75	.48	8.0	.28	.21	.95	32	3
with NPN	201	75	.75	.48	13.0	.28	.21	.95	32	3
with NPN + minerals	202	75	.75	.48	13.0	.50	.30	.95	32	3
Corn silage, 5.4 bu corn/ton										
without NPN	203	70	.71	.45	8.0	.28	.21	.95	32	3
with NPN	204	70	.71	.45	13.0	.28	.21	.95	32	3
with NPN + minerals	205	70	.71	.45	13.0	.50	.30	.95	32	3
Corn silage, 3.5 bu corn/ton										
without NPN	206	66	.65	.41	8.0	.28	.21	.95	32	3
with NPN	207	66	.65	.41	13.0	.28	.21	.95	32	3
with NPN + minerals	208	66	.65	.41	13.0	.50	.50	.95	32	3
Corn stalks, grazing	209	66	.65	.40	7.0	.30	.12	1.43	50	3
Corn husklage	210	50	.55	.23	3.7	.16	.08	1.43	80	3
Corn stalklage	211	45	.45	.18	4.2	.30	.12	1.43	50	3
Fescue, early, hay	213	62	.60	.33	10.5	.50	.36	1.87	90	3
medium hay	214	55	.50	.20	8.0	.40	.25	1.87	90	3
mature hay	215	45	.45	.15	6.0	.30	.15	1.87	90	3
Milo pasture	217	66	.65	.40	11.6	.50	.36	1.87	20	3
Milo residue	218	45	.45	.18	4.7	.49	.13	1.41	70	3
Oat hay	219	59	.58	.28	9.2	.23	.21	.97	90	3
straw	220	47	.45	.15	4.4	.30	.10	2.24	90	3
silage (dough)	222	59	.59	.30	9.7	.37	.30	3.41	32	3
Prairie hay	223	45	.45	.13	7.8	.51	.17	.97	90	3

*Energy and protein values, at a given stage of growth, are assumed the same irrespective of harvest and storage method. Users may want to alter this assumption.

TABLE 1. FEED NUTRIENT VALUES (continued)

Feed Specification Code	(2)	(3)	(4)	(6)	(7)	(8)	(11)	(12)		
Feed Description	Feed Code	NE _m	NE _g	Total Protein	Calcium	Phos.	Pot.	Dry Matter	Feed Type Code	
		TDN %	Mcal/lb DM	Mcal/lb DM	% of DM	% of DM	% of DM	% of DM		Usual %
Orchard grass, early, hay	224	57	.57	.25	11.0	.45	.37	2.10	90	3
medium, hay	225	50	.50	.20	9.7	.40	.30	2.10	90	3
mature hay	226	45	.45	.15	6.0	.30	.15	2.00	90	3
pasture	227	65	.68	.41	15.2	.42	.47	3.38	20	3
Quackgrass hay	228	45	.45	.18	7.7	.40	.30	2.00	90	3
Reed canarygrass hay	229	50	.50	.20	8.5	.33	.16	2.35	90	3
Rye grass pasture	230	71	.70	.45	16.3	.58	.56	3.40	20	3
Rye straw	231	31	.34	.00	3.0	.28	.10	.97	90	3
Sorghum silage, grain type	232	58	.57	.30	7.9	.34	.21	.44	32	3
forage type	233	58	.57	.29	9.0	.64	.23	3.00	32	3
Sorghum-sudan, silage	234	58	.57	.29	10.2	.55	.23	3.00	32	3
hay	235	58	.57	.29	12.7	.55	.23	3.00	90	3
pasture	236	63	.61	.35	12.7	.63	.23	3.00	20	3
Timothy, early, hay	237	58	.57	.28	12.0	.66	.34	.42	90	3
medium, hay	238	55	.50	.20	7.0	.52	.26	.42	90	3
mature hay	239	50	.45	.15	6.3	.38	.18	.42	90	3
pasture	240	66	.66	.40	9.3	.50	.35	2.40	20	3
Wheat straw	242	43	.40	.09	3.5	.17	.08	1.11	90	3
pasture	243	62	.60	.32	5.3	.35	.15	2.00	20	3

Table 2. Estimated Vitamin A Content of Feeds

	100% DM Basis	
	Mg. Carotene/lb.	Vitamin A, IU/lb.
Fresh green legumes and grasses, immature	75-200	30,000-80,000
Mature pasture	5-10	2,000-4,000
Dehydrated alfalfa meal, fresh very bright green color	120-150	48,000-60,000
After considerable storage time, bright green	50-80	20,000-32,000
Legume hays; cured rapidly with minimum exposure, bright green and leafy	20-30	8,000-12,000
Grass hays, well cured, good green color	10-15	4,000-6,000
Average quality, bleached, some green color	5-10	2,000-4,000
Legume silage	60-100	24,000-40,000
Corn silage, medium to good green color	5-30	2,000-12,000
Grains, mill feeds, protein concentrates by-products	.01-.2	4-80
Yellow corn and its by-products	1.5-2	600-800
Crop residues ^a	1-2	400-800
Mature hay	2-4	800-1,600

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