

## PART XIII

# Composition of Feeds

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Feed composition varies greatly by plant species, stage of growth and environmental conditions. The following table was modified from Nutrient Requirements of Beef Cattle, National Research Council, 7th revised ed., 1996. Terms used in the heading of the table are defined below:

### Definition of Terms

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<sup>b</sup>	DM % AF:	percent dry matter as fed
<sup>c</sup>	NDF % DM:	neutral detergent fiber concentration as a percentage of dry matter
<sup>d</sup>	Lignin % NDF:	lignin concentration as a percentage of neutral detergent fiber content
<sup>e</sup>	TDN % DM:	total digestible nutrient concentration as a percentage of dry matter
<sup>f</sup>	ME Mcal/kg:	metabolizable energy content
<sup>g</sup>	NE <sub>ma</sub> Mcal/kg:	net energy content of feed for maintenance
<sup>h</sup>	NE <sub>ga</sub> Mcal/kg:	net energy content of feed for gain
<sup>i</sup>	CP % DM:	crude protein concentration as a percentage of dry matter
<sup>j</sup>	CIP % CP:	degraded intake protein concentration as a percentage of crude protein content
<sup>k</sup>	UIP % CP:	ungraded intake protein concentration as a percentage of crude protein content
<sup>l</sup>	SolP % CP:	soluble protein concentration as a percentage of crude protein content
<sup>m</sup>	NPN % SolP:	nonprotein nitrogen concentration as a percentage of soluble protein content
<sup>n</sup>	ADFIP % CP:	acid detergent insoluble protein concentration as a percentage of crude protein content
<sup>o</sup>	Starch % NSC:	starch concentration as a percentage of nonstructural carbohydrate content
<sup>p</sup>	Fat % DM:	fat concentration as a percentage of dry matter
<sup>q</sup>	Ash % DM:	ash concentration as a percentage of dry matter

Part XIII General Compositions of Feeds<sup>ca</sup>

Grains and by-product feeds Common Name	DM %AF <sup>b</sup>	NDF %DM <sup>c</sup>	Lignin %NDF <sup>d</sup>	TDN %DM <sup>e</sup>	ME Mcal/kg <sup>f</sup>	NE <sub>ma</sub> Mcal/kg <sup>g</sup>	NE <sub>ga</sub> Mcal/kg <sup>h</sup>	CP %DM <sup>i</sup>	DIP %CP <sup>i</sup>	UIP %CP <sup>k</sup>	SoIP %CP <sup>l</sup>	NPN %SoIP <sup>m</sup>	ADFIP %CP <sup>n</sup>	Starch %NSC <sup>o</sup>	Fat %DMP	Ash %DM <sup>q</sup>
Bahiagrass Hay	90.00	72.00	11.11	51.00	1.84	1.00	0.45	8.20	63.00	37.00	25.00	96.00	6.50	6.00	1.60	11.00
Bermudagrass Late Vegetative	91.00	76.60	8.57	49.00	1.77	0.93	0.39	7.80	85.00	15.00	25.90	25.40	8.90	6.00	2.70	8.00
Brome Hay Pre-bloom	88.00	55.00	7.69	60.00	2.17	1.31	0.74	16.00	79.00	21.00	25.00	96.00	6.50	6.00	2.60	10.00
Brome Hay Late-bloom	91.00	68.00	11.11	55.00	1.99	1.14	0.58	10.00	59.00	41.00	25.00	96.00	6.50	6.00	2.30	9.00
Fescue K31 Hay	91.00	62.20	6.35	61.00	2.21	1.34	0.77	15.00	82.00	18.00	25.90	25.40	8.90	6.00	5.50	9.00
Fescue K31 Hay Full-bloom	91.00	67.00	7.46	58.00	2.10	1.24	0.68	12.90	77.00	23.00	25.90	25.40	8.90	6.00	5.30	8.00
Fescue K31 Hay Mature	91.00	70.00	10.00	44.00	1.59	0.75	0.22	10.80	86.00	14.00	25.90	25.40	8.90	6.00	4.70	6.80
Orchardgrass Hay, Early-bloom	89.00	59.60	7.70	65.00	2.35	1.47	0.88	12.80	77.00	23.00	25.00	96.00	5.70	6.00	2.90	8.50
Orchardgrass Hay, Late-bloom	90.60	65.00	11.40	54.00	1.95	1.11	0.55	8.40	64.00	36.00	25.00	96.00	6.10	6.00	3.40	10.10
Reed Canarygrass Hay	89.00	64.00	6.25	55.00	1.99	1.14	0.58	10.30	71.00	29.00	25.00	96.00	6.10	6.00	3.10	10.00
Ryegrass Hay	88.00	41.00	4.88	64.00	2.31	1.44	0.86	8.60	65.00	35.00	25.00	96.00	5.70	6.00	2.20	10.00
Sorghum Sudan Hay	91.00	66.00	6.06	56.10	2.03	1.18	0.62	11.30	69.00	31.00	20.00	95.00	11.00	10.00	1.80	9.60
Sorghum Sudan Pasture	18.00	55.00	5.45	65.00	2.35	1.47	0.88	16.80	88.00	12.00	45.00	11.11	5.00	90.00	3.90	9.00
Sorghum Sudan Silage	28.00	68.00	7.04	55.00	1.99	1.14	0.58	10.80	72.00	28.00	50.00	90.00	11.00	100.00	2.80	9.80
Timothy Hay Mid-bloom	89.00	63.70	7.46	57.00	2.06	1.21	0.64	9.70	69.00	31.00	25.00	96.00	6.10	6.00	2.70	7.00
Timothy Hay Full-bloom	89.00	64.20	8.82	56.00	2.02	1.18	0.61	8.10	62.00	38.00	25.00	96.00	6.10	6.00	2.90	5.20
Timothy Hay Seed Stage	89.00	72.00	12.50	47.00	1.70	0.86	0.32	6.00	50.00	50.00	25.00	96.00	6.50	6.00	2.00	6.00
Alfalfa Hay Early-Vegetative	91.00	33.00	18.18	66.00	2.39	1.51	0.91	30.00	90.00	10.00	30.00	96.00	10.00	10.00	4.00	10.00
Alfalfa Hay Late-Vegetative	91.00	37.00	18.92	63.00	2.28	1.41	0.83	27.00	89.00	11.00	30.00	93.00	10.00	10.00	3.80	9.00
Alfalfa Hay Early-Bloom	91.00	39.30	20.00	60.00	2.17	1.31	0.74	25.00	88.00	12.00	29.00	93.00	11.00	10.00	2.90	9.20
Alfalfa Hay Mid-Bloom	91.00	47.10	22.73	58.00	2.10	1.24	0.68	22.00	84.00	16.00	28.00	93.00	14.00	10.00	2.60	8.50
Alfalfa Hay Late-Bloom	91.00	53.00	23.02	52.00	1.88	1.04	0.49	17.00	82.00	18.00	26.00	92.00	18.00	10.00	1.50	8.00
Alfalfa Silage Early-Bloom	35.00	43.00	23.26	63.00	2.28	1.41	0.83	19.50	92.00	8.00	50.00	100.00	15.00	10.00	3.70	9.50
Alfalfa Silage Full-Bloom	40.00	51.00	23.53	55.00	1.99	1.14	0.58	16.00	91.00	9.00	40.00	100.00	21.00	10.00	2.70	8.00
Birdsfoot Trefoil, Hay	91.00	47.50	19.15	59.00	2.13	1.28	0.71	15.90	82.00	18.00	28.00	96.00	14.00	10.00	2.10	7.40
Clover Ladino, Hay	89.00	36.00	19.44	60.00	2.17	1.31	0.74	22.40	86.00	14.00	30.00	96.00	10.00	10.00	2.70	9.40
Clover Red Hay	88.00	46.90	17.86	55.00	1.99	1.14	0.58	15.00	80.00	20.00	25.00	92.00	20.00	10.00	2.80	7.50
Vetch Hay	89.00	48.00	16.67	57.00	2.06	1.21	0.64	20.80	86.00	14.00	28.00	96.00	14.00	10.00	3.00	7.00
Barley Silage	39.00	56.80	5.44	60.00	2.17	1.31	0.74	1.90	86.00	14.00	70.00	100.00	6.10	100.00	2.92	8.30
Barley Straw	91.00	72.50	13.75	40.00	1.45	0.60	0.08	4.40	30.00	70.00	20.00	95.00	65.00	100.00	1.90	7.50
Corn Cobs Ground	90.00	87.00	7.78	50.00	1.81	0.97	0.42	2.80	22.00	78.00	25.00	10.00	10.00	90.00	0.60	1.80

Grains and by-product feeds Common Name	DM %AF	NDF %DM	Lignin %NDF	TDN %DM	ME Mcal/kg	NE <sub>na</sub> Mcal/kg	NE <sub>ga</sub> Mcal/kg	CP %DM	DIP %CP	UIP %CP	SoIP %CP	NPN %SoIP	ADFIP %CP	Starch %NSC	Fat %DM	Ash %DM
Corn Silage 25% Grain	29.00	52.00	9.62	68.00	2.46	1.57	0.97	8.30	76.00	24.00	55.00	100.00	9.00	100.00	2.10	8.00
Corn Silage 35% Grain	33.00	46.00	8.70	69.00	2.49	1.60	1.00	8.60	77.00	23.00	50.00	100.00	9.00	100.00	2.60	7.00
Corn Silage 50% Grain	35.00	41.00	7.00	75.00	2.71	1.79	1.16	8.00	75.00	25.00	45.00	100.00	7.88	100.00	3.50	4.20
Corn Silage Immature (no ears)	25.00	60.00	5.00	65.00	2.35	1.47	0.88	9.00	78.00	22.00	45.00	100.00	4.50	100.00	3.10	11.00
Corn Silage Stalklage	30.00	68.00	10.29	55.00	1.99	1.14	0.58	6.30	68.00	32.00	45.00	100.00	4.50	100.00	2.10	9.00
Corn Stalks Grazing	50.00	65.00	10.00	65.85	2.38	1.50	0.91	6.50	69.00	31.00	20.00	95.00	13.57	10.00	2.10	7.20
Oat Silage Dough	36.40	58.10	16.07	59.00	2.13	1.28	0.71	12.70	85.00	15.00	50.00	100.00	10.00	100.00	3.12	10.10
Oat Straw	92.20	74.40	20.00	45.00	1.63	0.79	0.25	4.40	55.00	45.00	20.00	95.00	65.00	5.00	2.22	7.80
Oat Hay	91.00	63.00	9.09	53.00	1.92	1.07	0.52	9.50	68.00	32.00	30.00	93.00	10.00	90.00	2.40	7.90
Grain Sorghum Silage	30.00	60.80	9.38	60.00	2.17	1.31	0.74	9.39	73.00	27.00	45.00	100.00	5.00	100.00	2.64	5.00
Wheat Silage Dough	35.00	60.70	14.81	57.00	2.06	1.21	0.64	12.50	81.00	19.00	45.00	100.00	8.00	100.00	2.50	7.50
Wheat Straw	89.00	78.90	16.47	41.00	1.48	0.64	0.11	3.50	31.00	69.00	0.00	95.00	65.00	100.00	2.00	7.50
Barley Grain Heavy	88.00	18.10	10.53	84.00	3.04	2.06	1.40	13.20	66.93	33.07	17.00	29.00	5.00	90.00	2.20	2.40
Barley Grain Light	88.00	28.00	10.36	77.00	2.78	1.85	1.22	14.00	66.93	33.07	17.00	29.00	5.00	90.00	2.30	4.00
Corn Hominy	90.00	23.00	3.64	91.00	3.29	2.27	1.57	11.50	47.49	52.51	18.00	78.00	5.00	90.00	7.30	1.00
Corn Grain Cracked	88.00	10.80	2.22	90.00	3.25	2.24	1.55	9.80	44.67	55.33	11.00	73.00	5.00	90.00	4.06	1.46
Corn Dry Ear 56 lb/bu	87.00	28.00	7.10	82.00	2.96	2.00	1.35	9.00	46.03	53.97	16.00	69.00	3.00	90.00	3.70	1.90
Corn Ground Grain 56 lb/bu	88.00	9.00	2.22	88.00	3.18	2.18	1.50	9.80	57.37	42.63	11.00	73.00	5.00	90.00	4.30	1.60
Corn Grain Flaked	86.00	9.00	2.22	93.00	3.36	2.33	1.62	9.80	43.04	56.96	8.00	73.00	5.00	90.00	4.30	2.00
Corn HM Ear 56 lb/bu	72.00	28.00	7.10	85.00	3.07	2.09	1.42	9.00	62.05	37.95	30.00	80.00	8.28	100.00	3.70	1.90
Corn HM Grain 56 lb/bu	72.00	9.00	2.22	93.00	3.36	2.33	1.62	9.80	67.82	32.18	40.00	100.00	5.30	100.00	4.30	1.60
Cottonseed Black Whole	92.00	40.00	37.50	95.00	3.43	2.38	1.67	23.00	69.56	30.44	40.00	2.50	6.00	90.00	17.50	5.00
Cottonseed High Lint	92.00	51.60	34.04	90.00	3.25	2.24	1.55	24.00	69.56	30.44	40.00	2.50	6.00	90.00	17.50	4.16
Cottonseed Meal-mech	92.00	28.00	21.43	78.00	2.82	1.88	1.24	44.00	57.00	43.00	20.00	40.00	8.00	90.00	5.00	7.00
Cottonseed Meal-Sol 41% CP	92.00	28.90	23.08	75.00	2.71	1.79	1.16	46.10	57.00	43.00	20.00	40.00	8.00	90.00	3.15	7.00
Cottonseed Meal-Sol 43% CP	92.00	28.00	25.00	75.00	2.71	1.79	1.16	48.90	57.00	43.00	20.00	40.00	8.00	90.00	1.70	7.00
Molasses Beet	77.90	0.00	0.00	75.00	2.71	1.79	1.16	8.50	100.00	0.00	100.00	100.00	0.00	0.00	0.00	11.40
Molasses Cain	74.30	0.00	0.00	72.00	2.60	1.70	1.08	5.80	100.00	0.00	100.00	100.00	0.00	0.00	0.00	13.30
Oats 32 lb/bu	91.00	42.00	9.52	73.00	2.64	1.73	1.11	13.60	76.55	23.45	53.00	19.00	5.00	90.00	4.90	5.00
Oats 38 lb/bu	89.00	29.30	9.38	77.00	2.78	1.85	1.22	13.60	83.00	17.00	53.00	19.00	5.00	90.00	5.20	3.30
Rice Grain Ground	89.00	16.00	13.00	79.00	2.86	1.91	1.27	8.90	69.85	30.15	40.00	50.00	2.70	90.00	1.90	5.00
Rye Grain	88.00	19.00	5.30	84.00	3.04	2.06	1.40	13.80	78.99	21.01	53.00	19.00	4.00	90.00	1.70	2.00

Grains and by-product feeds Common Name	DM %AF	NDF %DM	Lignin %NDF	TDN %DM	ME Mcal/kg	NE <sub>ma</sub> Mcal/kg	NE <sub>ge</sub> Mcal/kg	CP %DM	DIP %CP	UIP %CP	SolP %CP	NPN %SolP	ADFIP %CP	Starch %NSC	Fat %DM	Ash %DM
Sorghum, Dry Grain	89.00	13.30	6.09	76.00	2.75	1.82	1.19	11.60	50.76	49.24	12.00	33.00	5.00	90.00	3.10	2.00
Sorghum, Rolled Grain	90.00	16.10	6.09	82.00	2.96	2.00	1.35	12.60	43.00	57.00	12.00	33.00	5.00	90.00	3.03	1.87
Sorghum, Steam Flaked	70.00	23.00	6.09	88.00	3.18	2.18	1.50	12.00	56.40	43.60	12.00	33.00	5.00	100.00	3.10	2.00
Wheat Ground	89.00	11.80	6.25	88.00	3.18	2.18	1.50	14.20	77.00	23.00	30.00	25.00	2.00	90.00	2.34	2.01
Wheat Middlings	89.00	35.00	5.95	83.00	3.00	2.03	1.37	18.40	77.15	22.85	40.00	75.00	3.00	90.00	3.20	2.40
Wheat Grain Hard red spring	88.00	11.70	6.25	84.00	3.04	2.06	1.40	14.20	73.95	26.05	30.00	73.00	2.00	90.00	2.00	2.00
Wheat Grain Soft white	90.00	9.70	4.29	85.00	3.07	2.09	1.49	11.30	73.95	26.05	30.00	73.00	2.00	90.00	1.90	2.00
Brewers Grain 21% Dry Matter	21.00	42.00	9.52	70.00	2.53	1.63	1.03	26.00	40.86	59.14	8.00	50.00	10.00	100.00	6.50	10.00
Brewers Grain Dehydrated	92.00	48.70	13.04	66.00	2.39	1.51	0.91	29.20	34.12	65.88	4.00	75.00	12.00	100.00	10.80	4.00
Canola Meal	92.00	27.20	12.76	69.00	2.49	1.60	1.00	40.90	67.85	32.15	32.40	65.00	6.38	90.00	3.47	7.10
Corn Gluten Feed	90.00	36.20	2.22	80.00	2.89	1.94	1.30	23.80	75.00	25.00	49.00	100.00	2.00	100.00	3.91	6.90
Corn Gluten Meal	91.00	37.00	2.70	84.00	3.04	2.06	1.40	46.80	38.08	61.92	4.00	75.00	2.00	100.00	2.40	3.00
Corn Gluten Meal 60% CP	91.00	8.90	7.14	89.00	3.22	2.21	1.52	66.30	41.00	59.00	4.00	75.00	2.00	100.00	2.56	2.86
Distillers Gr.+ solubles	25.00	46.00	9.09	88.00	3.18	2.18	1.50	29.50	27.19	72.81	19.00	89.00	21.00	100.00	10.30	5.00
Distillers Gr. Dehy.—Light	91.00	46.00	10.00	88.00	3.18	2.18	1.50	30.40	27.97	72.03	6.00	67.00	13.00	100.00	9.80	4.00
Distillers Gr. Dehy.—Inter.	91.00	46.00	10.00	88.00	3.18	2.18	1.50	30.40	26.35	73.65	6.00	67.00	18.00	100.00	10.70	4.60
Distillers Gr. Dehy.—Dark	91.00	46.00	10.00	88.00	3.18	2.18	1.50	30.40	25.92	74.08	6.00	67.00	21.00	100.00	9.80	4.00
Distillers Gr. solubles dehy.	91.00	23.00	4.35	88.00	3.18	2.18	1.50									
Distillers Gr. Wet	25.00	40.00	10.00	90.00	3.25	2.24	1.55	29.70	45.09	54.91	44.00	100.00	13.00	100.00	9.20	8.00
Lupins	90.00	33.00	10.00	78.00	2.82	1.88	1.24	26.00	33.40	66.60	25.00	68.00	12.00	100.00	9.90	4.00
Peanut Meal	92.40	14.00	10.00	77.00	2.78	1.85	1.22	34.20	69.20	30.80	26.00	23.00	3.00	90.00	5.50	5.10
Soybean Meal—44	89.00	14.90	2.14	84.00	3.04	2.06	1.40	52.90	80.00	20.00	33.00	27.00	1.00	90.00	2.30	6.30
Soybean Meal—49	90.00	7.79	2.50	87.00	3.15	2.15	1.47	49.90	65.00	35.00	20.00	55.00	2.00	90.00	1.60	7.20
Soybean Whole	90.00	14.90	1.54	94.00	3.40	2.35	1.65	54.00	65.00	35.00	20.00	55.00	2.00	90.00	1.10	6.70
Soybean Whole Roasted	90.00	13.40	10.00	94.00	3.40	2.35	1.65	40.34	75.00	25.00	44.00	22.73	3.00	90.00	18.20	4.56
Sunflower Seed Meal	90.00	40.00	30.00	65.00	2.35	1.47	0.88	42.80	38.31	61.69	5.70	100.00	7.29	90.00	18.80	5.80
Urea	99.00	0.00	0.00	0.00	0.00	0.00	0.00	25.90	80.00	20.00	30.00	18.20	300.00	30.00	5.00	200.00
Apple Pomace	22.00	41.00	2.00	68.90	2.49	1.60	1.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Bakery Waste	92.00	18.00	5.56	89.00	3.22	2.21	1.52	5.40	48.21	51.79	11.00	100.00	31.50	100.00	4.70	5.00
Soybean Hulls	91.00	66.30	2.99	80.00	2.89	1.94	1.30	0.00	100.00	0.00	0.00	0.00	0.00	100.00	7.90	10.00

<sup>a</sup> Nutrient Requirements of Beef Cattle, National Research Council, Seventh Revised Edition 1996.