

Composition of Selected Livestock Feeds

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Since feed is the major cost of producing livestock, most successful producers strive to meet the nutrient needs of their animals for an optimum level of performance at the lowest cost. Overfeeding or underfeeding leads to inefficient production and reduced profit potential, so making the most efficient use of feeds is of prime importance in securing profits. Rations must be properly balanced so that feeds are used most efficiently and animals remain healthy. Ration balancing is an important management tool the producer can use to maximize profits.

To begin ration balancing, a list of available feeds and their cost or value should be compiled. Next, information on their composition should be obtained. Feeds can be divided into two basic groups – forages and concentrates. Forages include pastures, hays, silages, haylages, crop residues and other high-fiber feeds. Concentrates include energy feeds (corn, milo, wheat, etc.), protein feeds (cottonseed meal, soybean meal, etc.) and commercial formulations of energy and protein feeds. Since most commercial companies guarantee the quality of their feed products, testing is usually not necessary. However, the feed tag may not provide a full list of nutrients and energy content. Therefore, testing commercial feeds may be needed to determine the best feeding rate.

“Book values” (as shown in this publication) can be used for nutrient content of grains and protein sources such as cottonseed meal and soybean meal unless there is a reason to suspect the feedstuff is not normal. Book values can also be used for byproduct feeds. However, nutrient composition of byproduct feeds can be highly variable, and a nutrient analysis is recommended when using these feedstuffs.

Importance of Forage Testing

Estimating the nutrient content of forages by visual evaluation or from book values will lead to errors in feeding. Nutrient values cannot be accurately estimated by visual appraisal or level of fertilization; forage nutrient composition can only be accurately assessed by laboratory methods. The nutrient content of plants varies from field to field, from farm to farm and from year to year as a result of differences in plant species and varieties, soil fertility, climatic factors (rain, wind, sunlight, temperature, etc.), stage of forage maturity and harvesting and storage methods. Therefore, the only way to know the quality of forage is to have it analyzed.

Feed Composition Table

Feed composition tables usually provide useful information on composition of concentrates, and they can provide some useful information on composition of forages when laboratory analyses are not available.

The nutrient composition of the feeds in the following table was compiled from (1) information contained in *Nutrient Requirements of Beef Cattle*, seventh revised edition, issued in 1996, under the direction of the Subcommittee on Beef Cattle Nutrition, Board of Agriculture of the National Research Council, (2) a University of Arkansas Division of Agriculture, Cooperative Extension Service forage and poultry litter database, which is denoted in the table as “AR” for Arkansas Average composition values and (3) Dairy One Laboratories internet-accessible database.

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Common Name	DM %AF	TDN %DM	ME Mcal/lb	NE _m Mcal/lb	NE _g Mcal/lb	DE Mcal/lb	NE _L Mcal/lb	CP %DM	RDP %CP	Fat %DM	Ca %DM	P %DM	Mg %DM	K %DM	S %DM
Hays															
Alfalfa Hay, Arkansas	88.0	63.3	1.04	0.64	0.38	1.27	0.65	19.50			1.21	0.31	0.27	2.18	0.24
Alfalfa Hay, Early Bloom	91.0	60.0	0.99	0.60	0.33	1.20	0.61	25.00	88.0	2.90	1.41	0.22	0.34	2.51	0.30
Alfalfa Hay, Early Vegetative	91.0	66.0	1.08	0.68	0.42	1.32	0.68	30.00	90.0	4.00	1.50	0.33	0.21	2.51	0.54
Alfalfa Hay, Full Bloom	91.0	55.0	0.90	0.52	0.26	1.10	0.56	17.00	82.0	3.40	1.19	0.24	0.27	1.56	0.27
Alfalfa Hay, Late Bloom	91.0	52.0	0.85	0.47	0.22	1.04	0.53	17.00	82.0	1.50	1.19	0.24	0.27	1.56	0.30
Alfalfa Hay, Late Vegetative	91.0	63.0	1.04	0.64	0.38	1.26	0.65	27.00	89.0	3.80	1.50	0.33	0.21	2.51	0.54
Alfalfa Hay, Mature	91.0	50.0	0.82	0.44	0.19	1.00	0.50	14.00	79.0	1.30	1.18	0.21	0.22	2.07	0.25
Alfalfa Hay, Mid Bloom	91.0	58.0	0.95	0.56	0.31	1.16	0.59	22.00	84.0	2.60	1.37	0.22	0.35	1.56	0.28
Bahiagrass Hay	90.0	51.0	0.84	0.46	0.21	1.02	0.51	8.20	63.0	1.60	0.50	0.22	0.19		
Bahiagrass Hay, Arkansas	88.1	52.0	0.85	0.47	0.22	1.04	0.53	9.80			0.50	0.21	0.25	1.33	0.18
Bermudagrass Hay, Arkansas	87.3	58.0	0.95	0.56	0.31	1.16	0.59	13.10			0.60	0.38	0.22	1.98	0.29
Bermudagrass Hay, Dairy One	93.2	56.0	0.92	0.53	0.28	1.12	0.57	10.90	57.3	1.89	0.50	0.20	0.20	1.68	0.40
Bermudagrass Hay, Late Vegetative	91.0	49.0	0.81	0.42	0.18	0.98	0.49	7.80	85.0	2.70	0.26	0.18	0.13	1.30	0.21
Clover Hay, Arkansas	87.9	56.7	0.93	0.54	0.29	1.13	0.58	14.30			1.21	0.28	0.27	1.85	0.19
Clover Hay, Ladino	89.0	60.0	0.99	0.60	0.33	1.20	0.61	22.40	86.0	2.70	1.45	0.33	0.47	2.44	0.21
Clover Hay, Red	88.0	55.0	0.90	0.52	0.26	1.10	0.56	15.00	80.0	2.80	1.38	0.24	0.38	1.81	0.16
Dallisgrass Hay, Arkansas	87.7	54.0	0.89	0.50	0.25	1.08	0.55	11.00			0.42	0.24	0.24	1.80	0.25
Fescue Hay	91.0	61.0	1.00	0.61	0.35	1.22	0.63	15.00	82.0	5.50	0.51	0.37	0.27	2.30	0.18
Fescue Hay, Arkansas	87.6	54.2	0.89	0.51	0.25	1.08	0.55	11.30			0.51	0.32	0.25	2.00	0.20
Fescue Hay, Full Bloom	91.0	58.0	0.95	0.56	0.31	1.16	0.59	12.90	77.0	5.30	0.43	0.32	0.17	2.30	0.26
Johnsongrass Hay, Arkansas	85.4	53.0	0.87	0.49	0.24	1.06	0.54	11.10			0.59	0.30	0.30	1.81	0.16
Mixed Grass Hay, Arkansas	88.0	54.0	0.89	0.50	0.25	1.08	0.55	11.50			0.56	0.29	0.26	1.74	0.21
Orchardgrass Hay, Arkansas	87.3	57.0	0.94	0.55	0.29	1.14	0.58	13.10			0.52	0.36	0.24	2.46	0.21
Orchardgrass Hay, Early Bloom	89.0	65.0	1.07	0.67	0.40	1.30	0.67	12.80	77.0	2.90	0.27	0.34	0.11	2.91	0.26
Orchardgrass Hay, Late Bloom	90.6	54.0	0.89	0.50	0.25	1.08	0.55	8.40	64.0	3.40	0.26	0.30	0.11	2.67	0.00
Peanut Hay, Dairy One	91.3	58.0	0.95	0.56	0.31	1.16	0.59	11.40	66.0	2.49	1.37	0.16	0.51	1.63	0.15
Ryegrass Hay	88.0	64.0	1.05	0.66	0.39	1.28	0.66	8.60	65.0	2.20	0.00	0.00	0.00	0.00	0.00
Ryegrass Hay, Arkansas	86.4	55.6	0.91	0.53	0.27	1.11	0.57	11.60			0.54	0.30	0.19	1.95	0.20
Small Grains Hay, Dairy One	91.5	58.3	0.96	0.57	0.31	1.17	0.60	10.20	64.0	2.22	0.40	0.24	0.17	1.90	0.17
Sorghum-Sudan Hay	91.0	56.1	0.92	0.54	0.28	1.12	0.57	11.30	69.0	1.80	0.51	0.31	0.37	2.08	0.06
Soybean Hay, Dairy One	92.3	59.2	0.97	0.58	0.32	1.18	0.61	15.10	63.6	2.44	1.38	0.21	0.40	1.52	0.19
Sundagrass Hay, Dairy One	93.1	54.1	0.89	0.50	0.25	1.08	0.55	8.10	58.0	1.66	0.46	0.21	0.30	2.12	0.13

Common Name	DM %AF	TDN %DM	ME Mcal/lb	NE _m Mcal/lb	NE _g Mcal/lb	DE Mcal/lb	NE _L Mcal/lb	CP %DM	RDP %CP	Fat %DM	Ca %DM	P %DM	Mg %DM	K %DM	S %DM
Silage															
Alfalfa Silage, Early Bloom	35.0	63.0	1.04	0.64	0.38	1.26	0.65	19.00	92.0	3.20	1.32	0.31	0.26	2.85	0.28
Alfalfa Silage, Full Bloom	40.0	55.0	0.90	0.52	0.26	1.10	0.56	16.00	91.0	2.70	1.74	0.27	0.33	2.35	0.31
Alfalfa Silage, Mid Bloom	38.0	58.0	0.95	0.56	0.31	1.16	0.59	17.00	91.0	3.10	1.74	0.27	0.33	2.35	0.31
Bermudagrass Silage, Dairy One	39.6	56.4	0.93	0.54	0.28	1.13	0.57	13.50	70.3	3.20	0.52	0.29	0.24	2.19	0.25
Corn Silage, 35% Grain	33.0	69.0	1.13	0.73	0.45	1.38	0.71	8.60	77.0	2.60	0.31	0.27	0.22	1.22	0.12
Corn Silage, 40% Grain	33.0	66.0	1.08	0.68	0.42	1.32	0.68	9.20	78.0	3.10	0.31	0.27	0.22	1.22	0.12
Corn Silage, 45% Grain	34.0	72.0	1.18	0.77	0.49	1.44	0.75	8.65	78.0	3.09	0.25	0.22	0.18	1.14	0.12
Corn Silage, 50% Grain	35.0	75.0	1.23	0.81	0.53	1.50	0.78	8.00	75.0	3.50	0.31	0.27	0.22	1.22	0.12
Corn Silage, Arkansas	38.0	64.0	1.05	0.66	0.39	1.28	0.66	9.20			0.32	0.25	0.18	1.19	0.12
Corn Stalks, Grazing	50.0	65.9	1.08	0.68	0.41	1.32	0.68	6.50	69.0	2.10	0.62	0.09		1.63	
Fescue Silage, Arkansas	43.0	57.0	0.94	0.55	0.29	1.14	0.58	13.50			0.41	0.38	0.27	2.60	0.26
Ryegrass Silage, Arkansas	43.0	58.6	0.96	0.57	0.32	1.17	0.60	12.70			0.59	0.41	0.19	2.45	0.22
Small Grains Silage, Dairy One	36.9	60.7	1.00	0.61	0.34	1.21	0.62	13.20	76.2	3.60	0.53	0.32	0.19	2.48	0.19
Sorghum Silage	30.0	60.0	0.99	0.60	0.33	1.20	0.61	9.39	73.0	2.64	0.49	0.22	0.28	1.72	0.12
Sorghum Silage, Arkansas	39.0	52.0	0.85	0.47	0.22	1.04	0.53	9.70			0.52	0.35	0.29	2.16	0.14
Sorghum Sudan Silage, Dairy One	30.8	57.7	0.95	0.56	0.30	1.15	0.59	11.90	69.5	3.29	0.56	0.29	0.28	2.48	0.17
Sorghum-Sudan Silage, Arkansas	33.0	60.0	0.99	0.60	0.33	1.20	0.61	10.90			0.57	0.32	0.32	1.56	0.13
Sorghum-Sudan, Silage	28.0	55.0	0.90	0.52	0.26	1.10	0.56	10.80	72.0	2.80	0.50	0.21	0.42	2.61	0.06
Soybean Silage, Dairy One	54.1	58.1	0.95	0.57	0.31	1.16	0.59	16.50	68.6	4.42	1.32	0.31	0.37	1.86	0.20
Wheat Silage, Arkansas	37.0	55.5	0.91	0.53	0.27	1.11	0.56	13.00							
Wheat Silage, Dough	35.0	57.0	0.94	0.55	0.29	1.14	0.58	12.50	81.0	2.50	0.44	0.29	0.17	2.24	0.21
Other Roughage Substitutes															
Corn Stalks, Arkansas	91.8	45.0	0.74	0.36	0.11	0.90	0.45	6.40							
Cotton Gin Trash, Dairy One	91.1	43.0	0.71	0.33	0.08	0.86	0.43	12.30		5.10	1.52	0.24	0.31	1.92	0.37
Cottonseed, Hulls	91.0	45.0	0.74	0.36	0.11	0.90	0.45	4.10	50.0	1.70	0.15	0.09	0.14	0.87	0.09
Grain Sorghum Stubble, Arkansas	64.9	53.0	0.87	0.49	0.24	1.06	0.54	7.80							
Peanut Hulls, Dairy One	93.6	37.5	0.62	0.23	0.00	0.75	0.36	9.80		4.70	0.28	0.11	0.14	0.72	0.10
Peanut Stubble, Arkansas	85.6	53.0	0.87	0.49	0.24	1.06	0.54	7.70							
Poultry Litter – Breeder Hen, Arkansas	78.0	49.0	0.81	0.42	0.18	0.98	0.49	23.40			2.81	2.53	0.71	2.79	0.79
Poultry Litter – Broiler, Arkansas	75.0	47.0	0.77	0.39	0.15	0.94	0.47	17.50			4.64	1.67	0.86	2.43	0.58
Rice Stubble, Arkansas	73.7	47.0	0.77	0.39	0.15	0.94	0.47	7.60							
Sugarcane Bagasse, Dairy One	93.4	48.1	0.79	0.41	0.16	0.96	0.48	2.88	21.9	0.88	0.34	0.04	0.08	0.40	0.09
Wheat Straw	89.0	41.0	0.67	0.29	0.05	0.82	0.40	3.50	31.0	2.00	0.17	0.05	0.12	1.41	0.19

Note: NRC (no row color), Dairy One (dark gray rows), Arkansas Forage Database (light gray rows)

Common Name	DM %AF	TDN %DM	ME Mcal/lb	NE _m Mcal/lb	NE _g Mcal/lb	DE Mcal/lb	NE _L Mcal/lb	CP %DM	RDP %CP	Fat %DM	Ca %DM	P %DM	Mg %DM	K %DM	S %DM
High Protein Feedstuffs															
Peanut, Meal	92.4	77.0	1.27	0.84	0.55	1.54	0.80	52.90	80.0	2.30	0.32	0.66	0.17	1.28	0.33
Soybean, Meal - 49	90.0	87.0	1.43	0.98	0.67	1.74	0.92	54.00	65.0	1.10	0.29	0.71	0.33	2.36	0.48
Corn Gluten, Meal	91.0	84.0	1.38	0.94	0.64	1.68	0.88	46.80	38.1	2.40	0.16	0.51	0.06	0.03	0.22
Corn Gluten, Meal 60%CP	91.0	89.0	1.46	1.00	0.69	1.78	0.94	66.30	41.0	2.56	0.07	0.61	0.15	0.48	0.90
Cottonseed, Meal - Sol-41%CP	92.0	75.0	1.23	0.81	0.53	1.50	0.78	46.10	57.0	3.15	0.20	1.16	0.65	1.65	0.42
Grains and Oilseeds															
Corn Dry, Grain 56 lb/bu	88.0	88.0	1.45	0.99	0.68	1.76	0.93	9.80	44.7	4.30	0.03	0.31	0.11	0.33	0.14
Corn Grain, Cracked	88.0	90.0	1.48	1.02	0.70	1.80	0.95	9.80	44.7	4.06	0.03	0.32	0.12	0.44	0.11
Corn Grain, Flaked	86.0	93.0	1.53	1.06	0.74	1.86	0.98	9.80	43.0	4.30	0.03	0.31	0.11	0.33	0.14
Corn Ground, Grain 56 lb/bu	88.0	88.0	1.45	0.99	0.68	1.76	0.93	9.80	57.4	4.30	0.03	0.31	0.11	0.33	0.14
Cottonseed, Black Whole	92.0	95.0	1.56	1.08	0.76	1.90	1.00	23.00	69.6	17.50	0.16	0.62	0.35	1.22	0.26
Cottonseed, High Lint	92.0	90.0	1.48	1.02	0.70	1.80	0.95	24.40	69.6	17.50	0.17	0.62	0.38	1.24	0.27
Oats, 32 lb/bu	91.0	73.0	1.20	0.79	0.50	1.46	0.76	13.60	76.6	4.90	0.07	0.30	0.16	0.45	0.23
Oats, 38 lb/bu	89.0	77.0	1.27	0.84	0.55	1.54	0.80	13.60	83.0	5.20	0.01	0.41	0.16	0.51	0.21
Rice Grain, Ground	89.0	79.0	1.30	0.87	0.58	1.58	0.83	8.90	69.9	1.90	0.07	0.36	0.14	0.53	0.05
Rice Grain, Polished	89.0	89.0	1.46	1.00	0.69	1.78	0.94	8.60	66.3	0.80	0.03	0.13	0.10	0.26	0.09
Sorghum, Dry Grain	89.0	76.0	1.25	0.83	0.54	1.52	0.79	12.40	50.8	3.10	0.05	0.34	0.14	0.47	0.12
Sorghum, Rolled Grain	90.0	82.0	1.35	0.91	0.61	1.64	0.86	12.60	43.0	3.03	0.04	0.34	0.17	0.44	0.14
Soybean, Whole	90.0	94.0	1.54	1.07	0.75	1.88	0.99	40.34	75.0	18.20	0.27	0.65	0.27	2.01	0.35
Wheat Grain, Hard Red Spring	88.0	84.0	1.38	0.94	0.64	1.68	0.88	14.20	74.0	2.00	0.05	0.42	0.16	0.41	0.17
Wheat Grain, Soft White	90.0	85.0	1.40	0.95	0.65	1.70	0.89	11.30	74.0	1.90	0.07	0.33	0.11	0.43	0.13
Wheat, Ground	89.0	88.0	1.45	0.99	0.68	1.76	0.93	14.20	77.0	2.34	0.05	0.44	0.13	0.40	0.14
Byproduct and Other Feedstuffs															
Bakery, Waste	92.0	89.0	1.46	1.00	0.69	1.78	0.94	9.00	75.6	12.70	0.15	0.24	0.18	0.43	0.02
Bakery Byproduct, Dairy One	89.7	90.1	1.48	1.02	0.70	1.80	0.95	13.30	69.6	9.80	0.29	0.39	0.14	0.49	0.17
Beet Pulp, Dehydrated	91.0	74.0	1.22	0.80	0.52	1.48	0.77	9.80	42.6	0.60	0.68	0.10	0.28	0.22	0.22
Brewers Grain, 21% Dry Matter	21.0	70.0	1.15	0.74	0.47	1.40	0.73	26.00	40.9	6.50	0.29	0.70	0.27	0.58	0.34
Candy Byproduct, Dairy One	90.3	90.0	1.48	1.02	0.70	1.80	0.95	11.30		13.50	0.24	0.24	0.11	0.43	0.10
Cereal Byproduct, Dairy One	91.1	82.6	1.36	0.92	0.62	1.65	0.87	11.40	47.0	5.00	0.28	0.41	0.15	0.50	0.15
Corn Gluten, Feed	90.0	80.0	1.31	0.88	0.59	1.60	0.84	23.80	75.0	3.91	0.07	0.95	0.40	1.40	0.47
Corn Steep Liquor, Dairy One	41.0	84.8	1.39	0.95	0.65	1.70	0.89	36.90		4.40	0.10	2.74	1.16	3.97	1.35

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Byproduct and Other Feedstuffs															
Corn, Hominy	90.0	91.0	1.50	1.03	0.71	1.82	0.96	11.50	47.5	7.30	0.05	0.57	0.26	0.65	0.03
Distillers Condensed Solubles, Dairy One	32.0	99.4	1.63	1.14	0.81	1.99	1.05	20.40	79.6	17.30	0.11	1.53	0.67	0.41	1.03
Distillers Gr., + Solubles	91.0	88.0	1.45	0.99	0.68	1.76	0.93	29.50	27.2	10.30	0.32	0.83	0.33	1.07	0.40
Distillers Gr., Solubles Dehy	91.0	88.0	1.45	0.99	0.68	1.76	0.93	29.70	45.1	9.20	0.32	1.40	0.65	1.83	0.40
Distillers Gr., Wet	25.0	90.0	1.48	1.02	0.70	1.80	0.95	29.70	33.4	9.90	0.32	1.40	0.65	1.83	0.40
Grain Screenings, Dairy One	89.7	76.3	1.25	0.83	0.55	1.53	0.80	12.80		6.50	0.39	0.37	0.20	0.74	0.16
Molasses, Beet	77.9	75.0	1.23	0.81	0.53	1.50	0.78	8.50	100.0	0.00	0.15	0.03	0.29	6.06	0.60
Molasses, Cane	74.3	72.0	1.18	0.77	0.49	1.44	0.75	5.80	100.0	0.00	1.00	0.10	0.42	4.01	0.47
Potato Byproduct, Dairy One	26.1	79.8	1.31	0.88	0.59	1.60	0.83	11.50	48.0	7.87	0.50	0.32	0.12	1.09	0.15
Rice, Bran (FULL FAT)	90.5	70.0	1.15	0.74	0.47	1.40	0.73	14.40	51.0	15.00	0.10	1.73	0.97	1.89	0.20
Soybean, Hulls	91.0	80.0	1.31	0.88	0.59	1.60	0.84	12.20	58.0	2.10	0.53	0.18	0.22	1.29	0.11
Vegetable Byproduct, Dairy One	24.0	64.3	1.06	0.66	0.39	1.29	0.66	18.90	52.5	7.10	0.77	0.44	0.28	2.58	0.34
Wheat , Middlings	89.0	83.0	1.36	0.92	0.62	1.66	0.87	18.40	77.2	3.20	0.15	1.00	0.38	1.10	0.19

Note: NRC (no row color), Dairy One (dark gray rows), Arkansas Forage Database (light gray rows)

List of Abbreviations Used

AF	As-Fed	ME	metabolizable energy	P	phosphorus
DM	dry matter	NE _L	net energy for lactation	Mg	magnesium
CP	crude protein	NE _m	net energy for maintenance	K	potassium
RDP	rumen degradable protein	NE _g	net energy for gain	S	sulfur
TDN	total digestible nutrients	Ca	calcium		
DE	digestible energy				

Protein (CP) and Total Digestible Nutrients (TDN) by Month for Different Grazed Forage Types in Arkansas

Month	Brassicas		Cool Season Annual		Cool Season Perennial		Warm Season		Warm Season Grass – Legume	
	CP	TDN	CP	TDN	CP	TDN	CP	TDN	CP	TDN
Jan			24 (3.9)	79 (5.6)	15 (3.8)	69 (7.4)				
Feb			24 (4.6)	79 (5.1)	14 (3.4)	66 (6.5)				
Mar			27 (4.3)	80 (6.0)	17 (5.6)	70 (8.8)				
Apr			19 (5.4)	71 (4.8)	22 (2.9)	75 (6.6)			18.4 (4.7)	68 (6.3)
May			18 (4.5)	69 (3.5)	19 (2.6)	71 (4.7)	15 (3.7)	63 (5.7)	21 (5.3)	68 (8.9)
Jun					18 (4.4)	70 (5.2)	17 (4.6)	65 (5.4)	17 (4.1)	64 (7.6)
Jul					16 (3.2)	67 (3.2)	14 (3.8)	62 (6.6)	16 (5.4)	61 (8.1)
Aug					14 (5.3)	65 (6.5)	14 (3.2)	64 (4.4)	15 (3.9)	62 (6.8)
Sep					16 (4.2)	66 (6.7)	14 (3.6)	64 (4.0)	14 (3.6)	63 (5.5)
Oct	Fall Growth 28 (6.5)	Fall Growth 82 (7.5)			18 (3.9)	72 (6.4)	13 (4.6)	66 (4.3)		
Nov	Stockpile Growth 19 (6.5) Bulbs 10.5 (NA)	Stockpile Growth 71 (7.5) Bulbs 79 (NA)	30 (5.3)	82 (4.3)	19 (4.6)	73 (8.4)	12 (3.5)	65 (4.4)		
Dec			24 (5.3)	80 (5.8)	17 (3.4)	76 (7.5)	12 (4.2)	63 (4.8)		

Mean (standard deviation)

Warm season values for October-December reflect stockpiled forage.

All values reported on a dry matter basis.

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