



MOTIVATING LANDOWNERS TO PURSUE, COMMIT, AND DELIVER ON-THE-GROUND CONSERVATION PRACTICES

MIDDLE PARK CONSERVATION DISTRICT

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## Interpreting Your Hay Results

Congratulations! You have made a decision that you will not regret. By testing your hay, you will have the knowledge to actively manage your herd's nutritional needs like never before. Now that you have your results, WHAT DO THEY MEAN?

The most basic Forage Test will test for Moisture, Crude Protein (CP), Acid Detergent Fiber (ADF), and Neutral Detergent Fiber (NDF). Total Digestible Nutrients (TDN) and Net Energy (NE) are calculated values based on Protein and Fiber results. **ALWAYS LOOK AT THE DRY MATTER BASIS COLUMN!!!** Crude Protein (CP) is a measure of the Nitrogen in the feedstuff and is commonly used as a standard for gauging protein requirements for animals. **Higher Crude Protein values are better.** Acid Detergent Fiber (ADF) is a measure of Feed Digestibility while Neutral Detergent Fiber (NDF) is a measure of Feed Intake/Satiation. **Lower values are better for both ADF & NDF!** The value for Total Digestible Nutrients (TDN) is the sum of all the digestible nutrients in a feedstuff and is used as a common measurement for Energy. TDN is especially useful for roughage-based diets. Net Energy (NE) also estimates energy but is more applicable to concentrate-based diets. Both of these values are calculated from ADF. **With either TDN or NE, Higher values are better!**

*In general, forages that contain less than 70% NDF and more than 8% crude protein (Dry Matter Basis) will contain enough digestible protein and energy, vitamins, and minerals to maintain older animals. However, growing, gestating, and lactating animals have higher nutrient requirements.*

**See the charts below for more specifics on hay quality!!!!**

**Table 4: Hay quality classification based on forage testing.**

Quality Standards	% DM Analyzed <sup>1</sup>			% DM Calculated <sup>1</sup>			
	CP2	ADF	NDF	TDN	DDM	DMI3	RFV
Prime	>19	<31	<40	>60	>65	>3.0	<151
1	17 - 19	31 - 55	40 - 46	59 - 56	62 - 65	3.0 - 2.6	151 - 125
2	14 - 16	36 - 40	47 - 53	55 - 52	58 - 61	2.5 - 2.3	124 - 103
3	11 - 13	41 - 42	54 - 60	52 - 51	56 - 57	2.2 - 2.0	102 - 87
4	8 - 10	43 - 45	61 - 65	50 - 49	53 - 55	1.9 - 1.8	86 - 75
5	<8	>45	>65	<49	< 53	< 1.8	<75

<sup>1</sup> Values in the columns are expressed in terms of percent dry matter, except for RFV and DMI.

<sup>2</sup> Abbreviations over columns are: CP = crude protein; ADF = acid detergent fiber; NDF = neutral detergent fiber; TDN = total digestible nutrient; DDM = digestible dry matter; RFV = relative feed value; DMI = dry matter intake.

<sup>3</sup> Based on percent of body weight (% BW).

Source: Coppock, 1997.

Table from <http://extension.msstate.edu/sites/default/files/publications/publications/p2539.pdf>

Testing Method	Description/Comment
<b>Sensory Evaluation</b>	
<b>Stage of maturity</b>	Look for the presence of seed heads (grass forages) or flowers or seed pods (legumes), indicating more mature forages
<b>Leaf to Stem ratio</b>	Look at forage and determine whether the stems or leaves are more obvious; good-quality legume forages will have a high proportion of leaves, and stems will be less obvious and fine
<b>Color</b>	Color is not a good indicator of nutrient content, but bright green color suggests minimal oxidation; yellow hay indicates oxidation and bleaching from sun, and hay will have lower vitamins A and E content
<b>Foreign Objects</b>	Look for presence and amount of inanimate objects (twine, wire, cans, etc.), weeds, mold, or poisonous plants
<b>Touch</b>	Feel stiffness or coarseness of leaves and stems; see if alfalfa stems wrap around your finger without breaking; good-quality hay will feel soft and have fine, pliable stems
<b>Smell</b>	Good quality hay will have a fresh mowed grass odor; no musty or moldy odors

Table from <http://extension.psu.edu/animals/camelids/nutrition/determining-forage-quality-understanding-feed-analysis>



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### NUTRIENT REQUIREMENTS

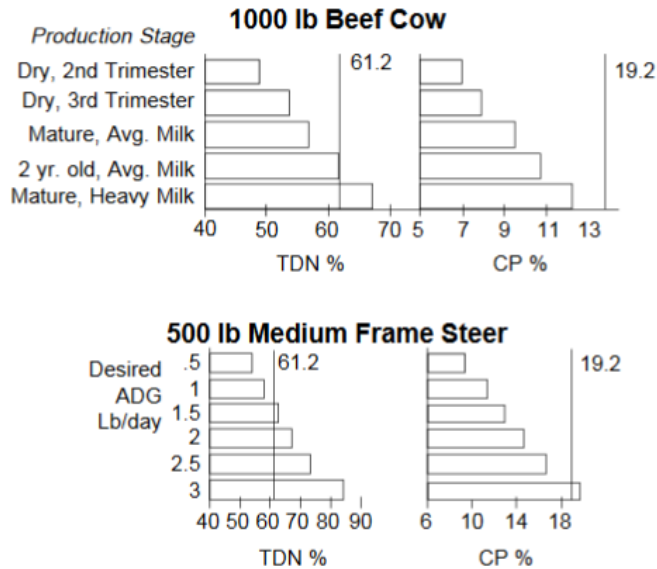


Chart from <http://www2.ca.uky.edu/agcomm/pubs/id/id101/id101.pdf>

**Table 2. Nutrient requirements for dry beef cows 1000, 1200, 1400 lbs.**

	Months to calving				
	5	4	3	2	1
----- 1000 lb cow -----					
DM intake, lbs/d	19.8	20.3	20.9	21.0	21.4
TDN, lbs/d	9.5	9.9	10.4	11.2	12.2
NEm, Mcal/d	8.12	8.52	9.20	10.29	11.61
CP, lbs/d	1.33	1.40	1.48	1.64	1.88
----- 1200 lb cow -----					
DM intake, lbs/d	22.7	23.3	23.9	24.1	24.6
TDN, lbs/d	10.9	11.4	12.0	12.8	14.0
NEm, Mcal/d	9.30	9.79	10.52	11.81	13.53
CP, lbs/d	1.54	1.61	1.72	1.90	2.19
----- 1400 lb cow -----					
DM intake, lbs/d	25.5	26.2	26.8	27.0	27.6
TDN, lbs/d	12.3	12.8	14.2	14.4	15.8
NEm, Mcal/d	10.46	11.00	11.79	13.23	15.18
CP, lbs/d	1.73	1.81	1.93	2.13	2.46

Adapted from Beef NRC (1996)

Intake and nutrient concentrations are expressed on a dry matter basis.

Table from <https://fyi.uwex.edu/wbic/files/2011/11/Hay-feed-analysis-draft-4.pdf>



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**Table I. Expected feed consumption by horses (percent body weight)<sup>1</sup>**

	Forage	Concentrate	Total
<b>Mature horses</b>			
Maintenance	1.5-2.0	0-0.5	1.5-2.0
Mares, late gestation	1.0-1.5	0.5-1.0	1.5-2.0
Mares, early lactation	1.0-2.0	1.0-2.0	2.0-3.0
Mares, late lactation	1.0-2.0	0.5-1.5	2.0-2.5
<b>Working horses</b>			
Light work <sup>2</sup>	1.0-2.0	0.5-1.0	1.5-2.5
Moderate work <sup>3</sup>	1.0-2.0	0.75-1.5	1.75-2.5
Intense work <sup>4</sup>	0.8-1.5	1.0-2.0	2.0-3.0
<b>Young horses</b>			
Nursing foal, 3 months	0	1.0-2.0	2.5-3.5
Weanling foal, 6 months	0.5-1.0	1.5-3.0	2.0-3.0
Yearling foal, 12 months	1.0-1.5	1.0-2.0	1.8-3.0
Long yearling, 18 months	1.0-1.5	1.0-1.5	2.0-2.5
Two-year-old, 24 months	1.0-1.5	1.0-1.5	1.75-2.5

<sup>1</sup>Air-dry feed (about 90% DM).

<sup>2</sup>Examples are horses used in pleasure, equitation or working 1-3 hours per day.

<sup>3</sup>Examples are horses in ranch work, roping, cutting, barrel racing, jumping, etc. or working 3-5 hours per day.

<sup>4</sup>Examples are horses in race training, polo, etc. or working more than 5 hours per day.

Table from: <http://alec.unl.edu/documents/cde/2017/livestock-management/2017-basics-of-feeding-horses-feeding-mgmt.pdf>

**Table 1. Minimum daily nutrient requirements for mature horses.\***

	Mature body weight lbs.	Digest energy M.cal/day	Crude protein		Calcium		Phosphorus		Vit A 1,000 IU's/day
			lbs./day	% of diet	grams/day	% of diet	grams/day	% of diet	
Mature horse at rest (maintenance)	440	7.4	.65	8	8	.25	6	.20	6.0
	880	13.4	1.18	8	16	.25	11	.20	12.0
	1100	16.4	1.45	8	20	.25	14	.20	15.0
	1980	24.1	2.13	8	36	.25	25	.20	27.0
Mature horse at moderate work**	440	11.1	.98	10	14	.30	10	.25	9.0
	880	20.1	1.77	10	25	.30	17	.25	18.0
	1100	24.6	2.17	10	30	.30	21	.25	22.0
	1980	36.2	3.20	10	44	.30	32	.25	40.0
Mares, last 30 days of pregnancy	440	8.9	.86	11	17	.50	13	.40	12.0
	880	16.1	1.56	11	31	.50	23	.40	24.0
	1100	19.7	1.91	11	37	.50	28	.40	30.0
	1980	29.0	2.81	11	55	.50	42	.40	54.0
Mares, peak of lactation*** 3 months	440	13.7	1.52	13	27	.50	18	.35	12.0
	880	22.9	2.52	13	45	.50	29	.35	24.0
	1100	28.3	3.15	13	56	.50	36	.35	30.0
	1980	45.5	5.67	13	101	.50	65	.35	54.0

\* From Nutrient Requirements of Horses, 1989, National Research Council.

\*\* Examples are horses used in ranch work, roping, cutting, barrel racing, jumping, etc.

\*\*\*Lactation level is assumed to be 3% of body weight/day.

Table from: <https://www.extension.purdue.edu/extmedia/as/as-429.html>