

NDF Digestibility: Reference Values for Forages, Byproducts and Total Mixed Rations

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Introduction

Numerous forage testing laboratories evaluate forages, byproduct feeds and total mixed rations for neutral detergent fiber digestibility (NDFD). Evaluation of forages and other feedstuffs for NDFD is being conducted to aid prediction of feed energy content and animal performance. Research has demonstrated that lactating dairy cows will eat more dry matter (DM) and produce more milk when fed forages or total mixed rations with optimum NDFD.

Understanding NDFD results from the laboratory is important. Laboratories have conducted sufficient evaluations of NDFD on forage, byproduct feeds and total mixed rations and general databases are available to help producers and nutrition consultants benchmark individual sample results. This Focus on Forage will highlight a simple NDFD database to aid producers and nutrition consultants in understanding laboratory NDFD values for forage, byproduct feeds and total mixed rations.

How was the NDFD database developed?

The NDFD of common forages, byproduct feeds and total mixed rations are presented in Table 1. The NDFD database was developed from databases available at the Marshfield Soil and Forage Analysis Laboratory, University of California-Davis (Dr. Peter Robinson personal communication) and Dairy One Laboratories in Ithaca, NY. The high and low values for NDF digestibility are not listed for forage or other feeds if sufficient sample numbers were not available.

How are database NDFD values used?

Because most producers and feed consultants now evaluate forages and other feeds for NDFD a simple set of benchmarks is useful. For example if a dairy producer

receives a laboratory evaluation that the 48 h in vitro NDFD of legume silage is 40.0 % of NDF what does this mean? Using Table 1, producers and nutrition consultants can quickly reference their NDFD value to similar materials. For example a 48 hr in vitro NDFD for legume silage of 40.0 % is low as identified by Table 1. The information in Table 1 can also be used to identify forages and feeds that are high in NDFD should such feeds be needed in animal diets to improve NDFD of the total diet. Finally, Table 1 provides 48, 30 and 24 h in vitro NDFD values to aid cross-referencing NDFD when determined by different in vitro incubation time points.

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Table 1. Reference NDF digestibility (NDFD) values for forages, total mixed rations and byproduct feeds.

Feed	In vitro NDFD, % of NDF ^{1,2}								
	High	Medium	Low	High	Medium	Low	High	Medium	Low
	48 h NDFD			30 h NDFD			24 h NDFD		
Legume Hay	55	50	44	49	40	33	39	32	27
Legume Silage	58	53	48	55	47	40	46	39	32
Grass Hay	65	54	44	57	48	40	45	37	29
Grass Silage	68	54	45	62	54	44	56	47	39
Legume/Grass Hay	59	48	37	53	44	35	43	37	30
Legume/Grass Silage	60	54	49	58	50	43	47	40	33
Red Clover Silage	50	47	44	.	.	.	.	.	.
Sorghum Sudan Silage	74	64	54	69	60	52	53	46	39
Straw	47	40	33	45	34	21	29	18	8
Corn Silage	64	59	54	60	52	44	41	36	30
Brown Mid-Rib Corn Silage	73	69	64	64	59	54	.	.	.
Small Grain Silage	67	56	46	57	50	42	56	45	34
Soybean Silage	52	47	39	46	38	29	.	.	.
Total Mixed Ration, High Group	63	57	51	.	.	.	.	.	.
Total Mixed Ration, Prefresh	64	55	43	.	.	.	.	.	.
Total Mixed Ration, Postfresh	61	56	50	.	.	.	.	.	.
Total Mixed Ration, Dry Cows	65	59	45	.	.	.	.	.	.
Total Mixed Ration, Heifers	62	54	43	.	.	.	.	.	.
Corn Gluten Feed	.	78	.	.	74	.	.	62	.
Distillers Dried Grains	73	63	53	73	58	44	60	50	40
Brewers Grains	.	54	.	.	50	.	.	.	.
Wheat Midds	.	54	.	53	44	40	.	.	.
Beet Pulp	.	87	.	90	84	76	.	.	.
Citrus Pulp	.	84	.	.	83	.	.	57	.
Soy Hulls	95	90	85	96	85	75	.	69	.
Whole Cottonseed ³	45	30	15	.	.	.	.	.	.
Soybean Meal	.	90	.	91	87	84	.	.	.
Barley	.	.	.	.	52	.	.	.	.
Steam Flaked Corn	.	.	.	82	74	66	.	.	.
Corn	.	76	.	.	50	.	.	.	.
Oathulls	.	36	.	.	.	.	.	.	.

¹ Adapted from data bases of the Marshfield Soil and Forage Analysis Laboratory, Peter Robinson, University of California-Davis and Dairy One Laboratory, Ithaca, NY

² High NDFD values represent the average plus 1 standard deviation. Low NDFD values represent the average minus one standard deviation. Feeds without high and low values do not contain enough samples to calculate a reliable standard deviation.

³ Determining NDFD on whole cottonseed is extremely difficult and values may or may not represent NDFD in dairy cattle.