

## **FORAGE QUALITY AND DAIRY PRODUCTION: WHAT QUALITY ATTRIBUTES DO WE LOOK FOR AND WHY?**

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Forages play a primary role in the construction of diets for dairy cattle. Ration formulation starts with the nutrients that forages provide, with other ingredients being purchased to balance the diet. In general, ruminant diets contain 40-60% forage, when formulated for milk production. The largest challenge in diet formulation is accounting for forage quality and the subsequent effects on ration consumption, digestion and milk production.

Western diets are largely based around dry alfalfa hay and/or corn silage, with the use of winter forages varying dramatically. In the west we also have a significant amount of high fiber, non forage byproducts, like almond hulls, that can contribute the forage load in diets.

The primary limitation with all ingredients is digestibility. Digestibility is the amount of the ingredient that will digest and be used for growth or production. In lactation diets, the amount of time that a feed takes to digest can limit intake. When selecting forages for lactation diets, a primary goal is to find highly digestible forages, enabling higher intakes, and higher levels of milk production. To test digestibility, we can run tests which measure the amount of the neutral detergent fiber (NDFD30) that will digest in a given amount of time (usually 30 hours) for lactating cows. This test approximates the amount of fiber that will be utilized by the cow in a reasonable amount of time, with the higher value being better. NDFD30 is not a common test in California, and therefore is not often presented at the time of forage purchase.

However, Acid Detergent Fiber (ADF) and Lignin are commonly included on the tests used sell and purchase forages. ADF and Lignin amounts are highly correlated to digestibility, and can be used as rules of thumb to sort higher quality forages when purchasing. The amount of ADF and Lignin that is acceptable varies between forage types, as does digestibility. Therefore, you can not simply compare these values between feeds, only within feed types. In table 1, you will find a range of acceptable forage ADF, NDF, and NDFD30 for each forage type.

Lastly, once forage quality has been evaluated, the amount of nutrient density needs to be compared. The primary nutrient in alfalfa is protein, corn silage is starch, and with all forages we look to maximize total digestible carbohydrates. A combination of forage quality, and nutrient density will be the ultimate determining factor of value. Forage digestibility not only affects the amount of fiber that digests, but with alfalfa, can limit the amount of protein that is available for use. In corn silage, reduced forage digestibility can limit the fermentation when ensiled and thus, limit the amount of starch that is digestible.

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Ultimately, forages play a primary role in diet design. With higher quality forages, dairy producers are able to increase production, health and efficiency of milk production. The value of forages is based on the ability for the cow to convert the ingredient to milk, in an efficient manner.

**Table 1: Basic Forage Quality Attributes for Lactating Dairy Cows**

	<b>Milk Cow Alfalfa</b>		<b>Corn Silage</b>		<b>BMR Corn Silage</b>	
<b>Dry Matter</b>	87-92%		30-38%		30-38%	
<b>Protein</b>	21	+	NA		NA	
<b>ADF</b>	28	-	25	-	25	-
<b>NDF</b>	32	-	42	-	44	
<b>Ligning</b>	6	-	3.6	-	2.5	-
<b>NDFD 30</b>	54	+	55	+	65	+
<b>Starch</b>	NA		28	+	27	+
<b>NEL</b>	0.65	+	0.71	+	0.73	+
<b>NEG</b>	0.39	+	0.47	+	0.5	+
<b>NEM</b>	0.65	+	0.71	+	0.75	+
<b>TDN</b>	55	+	70.4	+	73	+