Crop Management

Estimating Alfalfa Quality Using PEAQ

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Timing of alfalfa harvest is critical to obtaining optimum forage quality for dairy cattle, and it would be very useful for alfalfa producers to be able to plan ahead, particularly for spring harvest. While methods such as the scissors-cut method initiated in Wisconsin and the use of growing degree days have generated some interest, these methods have their shortcomings. One alternative is to use the PEAQ (Predictive Equations to estimate Alfalfa Quality) method, originally developed by Ken Albrecht and Rod Hintz at the University of Wisconsin.

PEAQ estimates fiber content (NDF) of standing alfalfa based on plant height (the tallest stem) and maturity stage (the most mature stage) in a sample. Other parameters were investigated, but these were considered the best compromise between estimation accuracy and ease of use. A representative 2 square foot area in a field is evaluated for the most mature stem stage, based on Gary Fick's Cornell staging system. The height of the tallest stem is measured from the soil surface. This is then repeated in at least 5 representative areas in the field. Wisconsin equations have been converted into a chart (courtesy of M. Rankin, University of Wisconsin-Extension) used to estimate NDF based on height and maturity stage.

Original PEAQ equations had been tested only in Wisconsin, where estimated NDF was found to be as accurate as commercial NIRS laboratory analysis. Alfalfa samples were collected in California, Ohio, Pennsylvania, New York and Wisconsin from producer-managed fields during 2 or 3 growing seasons (1994-96) to test the PEAQ equations across a wide geographic area. The accuracy of PEAQ in other states was as good as that observed in Wisconsin in the past. Nearly all samples were within plus or minus 3.5 percentage units of wet chemistry NDF. This compares to the accuracy of growing degrees days, which was plus or minus 6 percentage units, based on research in both New York and Michigan.

A major disadvantage for the technique for the Northeast is that it does not appear to work well for weedy fields or alfalfa-grass fields. The method is highly dependent on good sampling technique, and several samples per field are required to achieve good results. It also does not work on very short (less than 16 inches) or very tall (more than 40 inches) alfalfa.

For relatively pure stands of alfalfa, the PEAQ method of estimating alfalfa quality based on the tallest stem and the most mature stage is simple, fast and inexpensive. It appears to work fairly well across all cuttings of a season, not just first cut. The method also forces producers out into their fields for a close inspection of alfalfa development, which facilitates scouting for other alfalfa concerns, such as weevil or leafhopper damage.

Estimating Alfalfa NDF Content

Height of Tallest Stem (from soil to stem tip)	Stage of Most Mature Stem: Late Vegetative, Stem > 12 in., no buds visible	Early Bud, 1 to 2 nodes, with buds	Late Bud, more than 2 nodes, with buds	Early Flower, 1 node with 1 open flower	Late Flower, 2+ nodes with an open flower
-- inches --	% NDF				
16	28.5	29.3	30.1	31.0	31.8
17	29.2	30.0	30.8	31.6	32.5
18	29.9	30.7	31.5	32.3	33.1
19	30.6	31.4	32.2	33.0	33.8
20	31.3	32.1	32.9	33.7	34.5
21	32.0	32.8	33.6	34.4	35.2
22	32.7	33.5	34.3	35.1	35.9
23	33.4	34.2	35.0	35.8	36.6
24	34.0	34.9	35.7	36.5	37.3
25	34.7	35.5	36.4	37.2	38.0
26	35.4	36.2	37.0	37.9	38.7
27	36.1	36.9	37.7	38.5	39.4
28	36.8	37.6	38.4	39.2	40.0
29	37.5	38.3	39.1	39.9	40.7
30	38.2	39.0	39.8	40.6	41.4
31	38.9	39.7	40.5	41.3	42.1
32	39.6	40.4	41.2	42.0	42.8
33	40.3	41.1	41.9	42.7	43.5
34	40.9	41.8	42.6	43.4	44.2
35	41.6	42.4	43.3	44.1	44.9
36	42.3	43.1	43.9	44.8	45.6
37	43.0	43.8	44.6	45.4	46.3
38	43.7	44.5	45.3	46.1	46.9
39	44.4	45.2	46.0	46.8	47.6
40	45.1	45.9	46.7	47.5	48.3