

IMPACT



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New Tool Developed to Assist Producers in Measuring Alfalfa Hay Moisture in the Windrow

The Situation

The key to safe alfalfa hay storage is knowing the accurate windrow moisture level when baling and stacking the product. Each growing season alfalfa hay producers struggle with moisture levels in windrowed alfalfa. Inadequate or low levels of moisture in the windrowed product cause leaf shatter and low leaf to steam retention. Both characteristics are undesirable when producing dairy quality alfalfa hay and cause financial losses up to thirty dollars per ton. However, in contrast to the opposite extreme of high moisture levels that cause browning, quality degradation and in some cases even hay stack fire. Knowing when the alfalfa is ready to bale has been anyone's guess. Many old wives tales have been used by the producer to determine when hay is ready to bale. However, none have proven to be reliable, nor accurate.

It was discovered that many differing factors affect the drying time of alfalfa after being placed in the windrow.

- Maturity of the alfalfa at harvest.
- Lower and higher elevations areas within a field.
- Stand quantity within the windrow.
- Soil moisture retention under the windrowed product.
- Raking and conditioning techniques.
- Humidity present during the curing process.

Our Response

Extension Educator, Ron Thaemert, recognized that each one of these factors plays a significant role in the curing and drying process of alfalfa hay in the windrow. Because it is difficult to know how successful alfalfa hay at differing levels of dryness will bale, a method of testing each windrow quickly and accurately was needed. A simple tool was developed and tested for two years that could be used to simulate the compaction mechanism of the baling process. The Windrow Sampling Tool, along with a commercially available Bale Moisture probe, can be used to accurately measure moisture in the windrow at numerous locations in a relatively short amount of time.

At the completion of data computation and after the accuracy of the tool was acknowledged, protocol for the use and construction of the tool was disseminated at forage producer meetings.

- Annual Idaho Hay Growers Association District meetings: Twin Falls, Fairfield, Idaho Falls, Preston, Caldwell and Moscow (367 producers attended).
- 2002 Western Alfalfa & Forage Conference Reno, Nevada (650 producers attended).
- Utah Farm Bureau Forage growers Annual meeting St. George Utah (160 producers attended).
- Wells Rural Electric Co Annual stock holders meeting, Ruby Valley Nevada (65 producers attended).

Data Collected from the Windrow Sampling Tool

Sample	Probe Reading Interval				Probe Average	Actual % Oven Dry	Error %
	4 inches	8 inches	12 inches	16 inches			
1.	10.7	11.1	11.8	10.9	11.2	10.9	0.30
2.	11.6	11.9	12.8	14	12.6	11.2	1.37
3.	12	13.7	13.3	12.4	12.8	10.4	2.45
4.	14.4	9.4	14.8	15	13.4	15.5	-2.12
5.	16.1	17	16.3	16.5	16.5	16.2	0.27
6.	18.6	15.4	15.6	21.1	17.7	19.8	-2.13
7.	15.9	13.3	21.2	22.7	18.3	21.0	-2.73
8.	19.2	19.9	21.4	20.5	20.3	18.8	1.45
9.	27.9	28.2	23.7	20.9	25.2	24.4	0.77
10.	28.8	28.0	31.3	22.4	27.7	25.0	2.65
				standard dev of the difference in tech vs oven			1.93
		between technique and oven		R squared	0.87		
		between technique and oven		correlation coef.	0.93		
				Confidence in difference			1.1

Above Table Explanation:

Ten samples are shown to illustrate the accuracy of the tool, each sample was measured with a bale moisture probe at a four inch depth, eight inch depth, twelve inch depth and again at a depth of sixteen inches. Moisture readings were taken at each depth and totaled. Average percent moisture was calculated to derive a mean and then compared to the actual oven dried sample. The difference in probe average test and actual oven dried sample is presented in (**Error%**) column. Standard deviation is a measure of the spread about the mean, it was calculated from figures in the (**Error%**) column. In this table 1.93% + or - is the spread about the mean of the ten samples tested.

Program Outcomes

As a result of articles published in nationally acclaimed forage magazines the Windrow Sampling Tool has gained recognition throughout the United States. Individual producers using the tool are from

Pennsylvania, Illinois, North and South Dakota, Nevada, California, New Mexico, Washington, Oregon and Idaho.

- University of Idaho CIS (Current Information Series) will be available for producer access June 2003.
- University of Idaho Forage Handbook (Chapter 9 Hay Harvest Management) provides detailed information on use and protocol for the Windrow Sampling Tool.
- Hay & Forage Grower Magazine; Overland Park, KS 66212-2216 (Volume 18, No. 2).
- Super Hay Today Magazine; 333 E Feedville Rd. Hermiston, OR 97838 (Winter 2003 Issue).
- Western Farmer Stockman Magazine; 1355 Willow Way, Suite 260 Concord, CA 94520 (March 2003 Issue).

The Future:

The response to this tool from producers has increased rapidly. To accommodate the demand for the tool, Circle C Equipment Company, in

Hermiston, OR will have a similar commercial device on the market for the 2003 growing season.

For More Information

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