# SAMPLING THE MOISTURE CONTENT OF ALFALFA IN THE WINDROW

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ABSTRACT

The production of high quality, dry, baled forage in Southern Idaho faces increasingly high demands. According to the 2000 Idaho Agriculture Statistics, the eighteen south-central and southwestern counties provide homes for 1,309,000 head of livestock, and this number continues to grow. Forage production will need to follow the same growth pattern as cattle numbers if these demands are to be met Supplying large amounts of excellent quality dairy forage is a problem producers are being faced with each growing season. Excellent quality forage means a higher leaf to stem ratio. This can only occur when the forage product is baled and handled at higher moisture levels. Higher moisture levels increase the risk for spoilage and, at times, fire in the stored product. Knowing the accurate moisture level of the forage is the key to preservation of a high quality product for marketing.

## INTRODUCTION

Regardless of your situation, if forage crops are used in your crop production program for rotational purposes, or as a primary cash crop, your goal should be to produce a high quality marketable product. As a forage producer, you realize the importance of timely harvesting. This includes proper growth stage of the forage, as well as leaf retention on the stem. Properly adhering leaves to the stem requires moisture in the windrow, stem moisture, or dew moisture. However, too much moisture often proves to be costly by causing molding or quality degradation and can cause internal combustion and destruction of the entire lot of hay.

The big question arises; “WHEN DO I BALE THAT ALFALFA”? The answer is not always simple and it is not recommended to use the “I SEE I DO” concept. This concept comes from the attitude of, “I see my neighbor baling his hay, so my hay must also be ready to bale”. This attitude is not always correct and should only be adopted if money is not an issue for the producer, or if gambling is a priority. After swathing, several important factors affect the drying time of alfalfa. Alfalfa swathed on the same day, in different fields, or in random locations, even in the same field may dry at various times. The following is a short list of factors that affect windrow drying time and should be considered prior to baling.

- Maturity of alfalfa at harvest
- Low and high elevation areas within a field
- Stand quantity within the windrow
- Soil moisture retention under the windrow

The next question is, “How can I test the windrow for moisture?” Numerous methods for testing windrow moisture have been devised by the individual producer. However, many of the methods are not accurate or are not timely.

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- The OLD TWIST, break the stem method = (Not Accurate)
- Take windrow sample to local lab for drying = (Slow)
- Microwave in your wife's oven = (Not Good for a Long Marriage)
- Use Moisture Probe or Meter = (Good Idea)
  if used accurately and if sufficient samples are taken

Other methods of testing for moisture in the windrow can be accomplished by using a field moisture drier, such as the KOSTER DRIER. Drying units are acceptable, but have some limitations. Usually, the field drier takes at least thirty minutes for sample results and requires a source of electricity. One must remember that taking an individual sample from one location in the field is not adequate, and will not reveal the moisture level across the entire field. Similar to testing for quality, where twenty samples form each lot of hay are recommended, I suggest that numerous random windrow samples be taken across the entire field. As you can see, using the field moisture drier for numerous samples can become a very time consuming and a lengthy process.

My recommendation to the alfalfa producer for sampling windrow moisture is, to use a bale moisture probe and a windrow-sampling tool. The windrow-sampling tool is designed to simulate the compaction of hay in the bale and can still be used as a drying sample to double check probe accuracy when oven dried.

## PROTOCOL FOR SAMPLING WINDROW MOISTURE

Acquiring accurate windrow moisture samples can be accomplished with the help of the inexpensive windrow-sampling tool and by following a few very simple steps.

STEP: 1

Selecting the correct location in the field for sampling is not as important as the number of samples that are taken. It is suggested that numerous, (*20 samples per 200 ton of hay*) random samples, be taken across the whole spectrum of the field. This assures the producer that adequate representation of the entire field has been collected.

STEP: 2

Now that one of many sample sites has been selected, roll the windrow over exposing the underneath side. Under normal conditions this site will have bright green, unbleached hay. With your bare hand, feel for the dampest hay in the newly exposed windrow. Fold a small portion of the damp area into a ball and begin twisting the folded hay into the sampling tool. Additional hay from the windrow will need to be added to the tool as you continue to turn the sample into the tool. Continue twisting and adding forage into the sampling tool until full.

STEP: 3

To complete the sampling process, it is necessary to compress the gathered materials in the tool with the plunger. Place sampling tool with the capped end on the soil surface, exposing the open end in an upward position. Place plunger in the open end of sampling tool and force downward. This compresses the forage in the sampling tool, simulating compaction of baled hay.

STEP: 4

Upon completion of step three the sampling procedure is finished. It is now time to test the gathered sample for moisture. Insert the pointed end of a twenty-inch hay moisture tester approximately four inches into the gathered sample (*take moisture reading*). Continue taking moisture readings at each of the following depths; 8, 16, and 20 inches. Total the four moisture readings and calculate the average. Continue the above procedure across the entire field in random locations. You should have ample moisture samples on which you can base your baling decision.

CAUTION:

Caution should be taken after multiple samples are gathered. The brass portions of the hay moisture meter may develop poor conductivity due to build up of moist hay accumulation. Build up can be easily removed by lightly scouring the brass portions of the instrument with fine steel wool. Remember that hay moisture testers may vary in readings, and it is necessary to compare your field samples to actual oven dried samples. It is highly recommended that samples be oven dried to allow for adjustment in probe accuracy.

## ESTIMATED

## *WINDROW SAMPLING TOOL COST*

| | | |
|---|---|---|
| • 2 feet of 2 inch ABS pipe | $0.90 | |
| • 3 feet of 1 ¼" PVC pipe | $1.62 | |
| • 2 = 1 ¼" PVC pipe caps | $0.99 | |
| • 2" ABS clean out adapter | $1.59 | |
| • 2" ABS clean out plug | $0.83 | |
| TOTAL ESTIMATED COST | | $5.93 |

## CONCLUSIONS

It is important to remind producers that by not sampling alfalfa windrows for moisture content, they are subjecting themselves to alfalfa quality degradation or even haystack losses due to fire. Samples taken from the Windrow Sampling tool should be oven dried to determine the accuracy of the Hay Moisture Tester Probe being used. Remember the following points to assure even representation of the entire field when sampling for moisture:

- Take numerous random samples
- Take samples from diverse areas of the field
- Test samples from various windrows
- Take wettest sample from the underneath side of the windrow
- Oven dry the sample for accuracy test

**Table 1. Windrow moisture concentration determined by electronic moisture probe at 4, 8, 16, and 20 inches, probes 1-4, respectively, in the Windrow Sampling Tool as compared to the oven-dried sample.**

| SAMPLE | Probe 1 | Probe 2 | Probe 3 | Probe 4 | Average probe | Oven-dry moisture content | Moisture difference |
|---|---|---|---|---|---|---|---|
| | ------------------Windrow moisture content (%) ----- ----------- | | | | | | |
| 8 Lowe | 10.7 | 11.1 | 11.8 | 10.9 | 11.2 | 10.9 | 0.30 |
| 9 Lowe | 11.6 | 11.9 | 12.8 | 14.0 | 12.6 | 11.2 | 1.37 |
| 4 Huyser | 12.0 | 13.7 | 13.3 | 12.4 | 12.9 | 10.4 | 2.45 |
| 15 Lezamiz I | 14.4 | 9.4 | 14.8 | 15.0 | 13.4 | 15.5 | -2.12 |
| 6 Brown | 16.1 | 17.0 | 16.3 | 16.5 | 16.5 | 16.2 | 0.27 |
| 5 Huyser | 16.6 | 16.7 | 17.4 | 16.1 | 16.7 | 11.3 | 5.40 |
| 7 North | 18.6 | 15.4 | 15.6 | 21.1 | 17.7 | 19.8 | -2.13 |
| 3 Taber | 15.9 | 13.3 | 21.2 | 22.7 | 18.3 | 21.0 | -2.73 |
| 1 Taber | 17.9 | 16.6 | 18.6 | 20.3 | 18.4 | 15.0 | 3.35 |
| 16 Lezamiz II | 19.2 | 19.9 | 21.4 | 20.5 | 20.3 | 18.8 | 1.45 |
| 14 H/Requa II | 25.5 | 24.8 | 20.4 | 19.6 | 22.6 | 19.1 | 3.47 |
| 12 Huyser | 20.3 | 21.1 | 23.2 | 26.9 | 22.9 | 15.5 | 7.37 |
| 10 Lowe | 27.9 | 28.2 | 23.7 | 20.9 | 25.2 | 24.4 | 0.77 |
| 11 Tews II | 22.0 | 24.7 | 30.6 | 24.4 | 25.4 | 21.0 | 4.24 |
| 13 H/Requa 1 | 25.6 | 23.6 | 25.9 | 28.1 | 25.8 | 20.3 | 5.50 |
| 2 Tews | 28.8 | 28.0 | 31.3 | 22.4 | 27.7 | 25.0 | 2.65 |

| | | | |
|---|---|---|---|
| Average difference in probe versus oven-dried sample: | | | 1.98 |
| Standard deviation of the difference in technique vs oven: | | | 2.91 |
| between technique and oven | R squared | 0.696 | |
| between technique and oven | correlation coef. | 0.834 | |
| Confidence in difference | | | 1.82 |