

CHECKING IN ON WISCONSIN ALFALFA YIELD AND PERSISTENCE

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Introduction

Unlike corn and soybeans, obtaining accurate yield information for forage crops involves considerable planning, time, and effort on behalf of the person collecting the yield data and the farmer. Historically, few producers had the capacity or patience during harvest to undertake such a task. Most efforts to measure alfalfa yield in the past were usually limited to the best small area of the best field. Currently, many larger dairies have installed on-farm scales for measuring purchased production of forages and/or feed commodities. These scales now make it relatively easy to weigh production not just from small areas of fields, but entire fields over the course of several years.

Knowing actual alfalfa production offers some unique value beyond just documenting what is being harvested on Wisconsin farms. It allows us to contrast what is being found with current small-plot research trials and identify management areas where improvements can be made. Further, we can document progress over time.

During the early spring of 2007, members of the University of Wisconsin-Extension Team Forage decided to initiate the Wisconsin Alfalfa Yield and Persistence Program. The objectives of the program were to:

1. Verify the yield and quality of alfalfa harvested from production fields over the life of the stand beginning with the first production year (year after seeding).
2. Quantify decreases in stand productivity of alfalfa fields as they age.

To date, 64 Wisconsin alfalfa fields have been measured for yield and stand persistence.

Data Collection

Each year, interested producer participants with qualifying fields are solicited. All fields in the program are entered at the beginning of the first production year (the year following seeding). Further, fields must remain in the program for the life of the stand. For each field, an accurate measure of field size is determined (if not previously calculated). Forage yield from an entire project field is weighed (usually this is done with an on-farm drive over scale). Both empty and full weights for all trucks/wagons used are recorded. Two forage samples from each harvest are taken and submitted to the Marshfield Soil and Forage Analysis Laboratory for NIR analysis. Data from the two forage samples are averaged and recorded by the local coordinator. Information is inputted into an Excel spreadsheet program and shared with the producer following each harvest. At the end of the season, all data are collected and summarized. An annual summary report is available on the UW-Extension Team Forage web site at <http://fyi.uwex.edu/forage/alfalfa>.

Project Summary

Harvest Schedules

Mean cutting dates by year are presented in Table 1. Average first-cut date has ranged from May 16 in 2012 to June 10 in 2013. Regardless of first-cut date, the average fourth-cut date is generally within a week of September 1, with 2012 (earlier) and 2014 (later) being the notable exceptions. The large majority of fields in this study were cut four times. Across years and sites, 13 fields were cut three times, 109 fields were cut four times (generally prior to or soon after September 1), and 20 fields were cut five times (generally four times before September 1 with a final cut in October).

Year	1st cut date	2nd cut date	3rd cut date	4th cut* date	5th cut date
2007	22-May	24-June	25-July	30-Aug	21-Oct
2008	3-Jun	3-Jul	3-Aug	29-Aug	29-Oct
2009	31-May	1-Jul	4-Aug	5-Sep	
2010	22-May	28-Jun	2-Aug	29-Aug	12-Oct
2011	31-May	1-Jul	31-Jul	31-Aug	
2012	16-May	14-Jun	14-Jul	10-Aug	21-Sep**
2013	10-Jun	11-Jul	6-Aug	7-Sep	
2014	4-Jun	9-Jul	7-Aug	13-Sep	

* Average excludes data where a 4th cut was taken in October.

** Average includes 2 fields with 5th cuts taken in late-August and 2 taken in early September.

Forage Dry Matter at Harvest

Alfalfa was harvested as haylage for all but 14 individual cuttings over the 8 years. Harvest dry matter data from the dry hay harvests were not included in the forage dry matter data means. Although project participants are not asked about storage structure, there is good reason to believe most of the farms are storing this forage in bunker or pile silos.

From 2007-2010 forage dry matter ranged between 47 to 50%; during this time many people questioned if this was too dry for obtaining optimum storage porosity in a bunker silo or pile. In the past four years mean dry matters have ranged from 40 to 47%. In 2014, dry matter averaged 43%, though two fields averaged over 50%. Mean dry matter by year and cutting is presented in Figure 1.

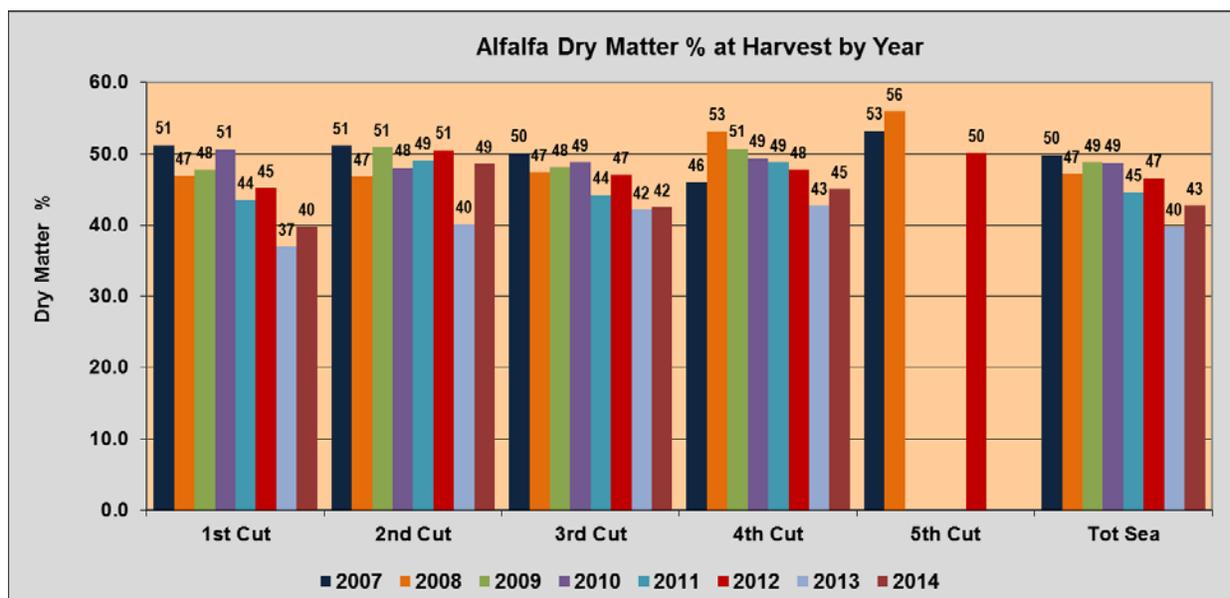


Figure 1. Average dry matter of harvested forage by cutting and as a weighted average for the total season (2007-2014).

Forage Dry Matter Yield

Average total-season dry matter yield variation for 2014 fields is presented in Figure 2. There was a wide range in success for achieving high yields. Fields ranged from 3.1 to 6.3 tons per acre, with 11 of 24 fields averaging under 4 tons. Three fields averaged over 6 tons per acre. The overall average dry matter yield for 2014 was 4.4 tons per acre, 0.4 tons greater than 2013 but below several of the previous years (Fig. 3).

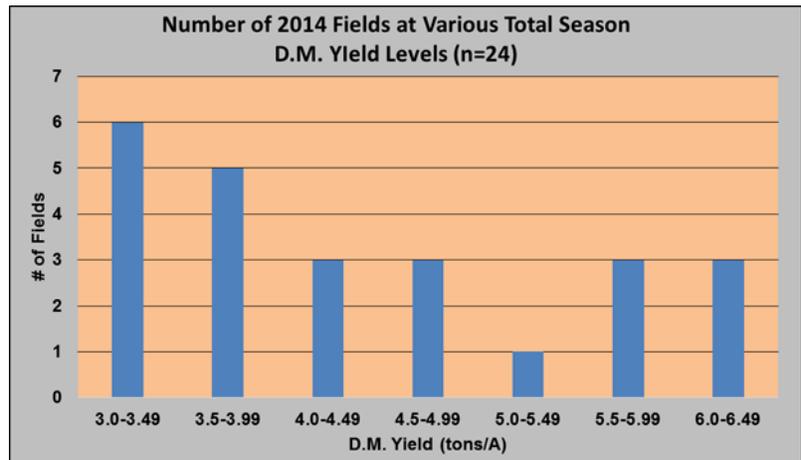


Figure 2. Number of 2014 fields at various yield levels (n=24)

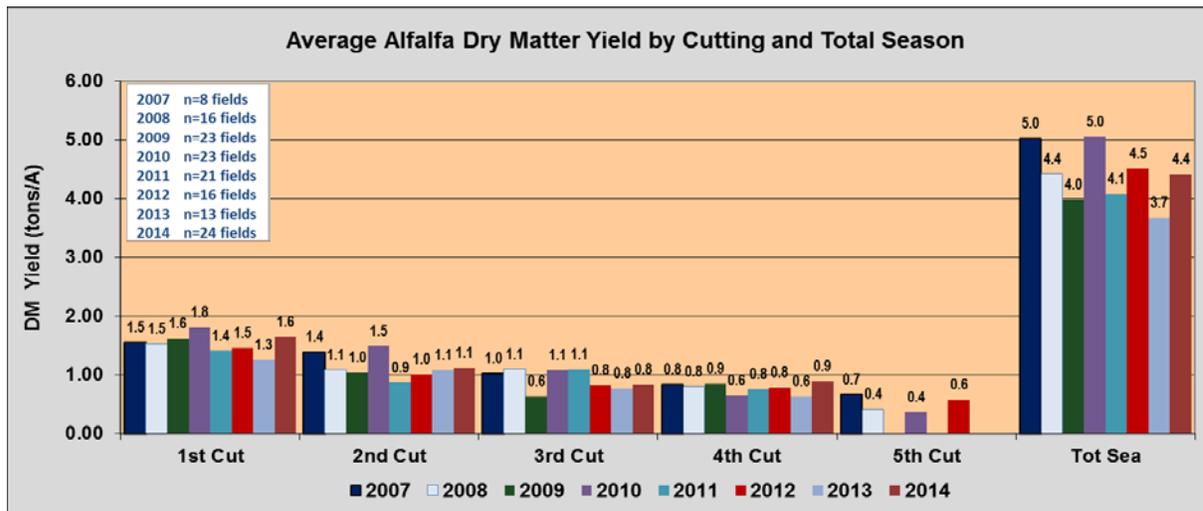


Figure 3. Average alfalfa dry matter yield by cutting and for the total season (2007-2014).

Alfalfa Persistence

One of the objectives of this project is to document how production fields are maintaining yields within a single year and over the course of their life. The amount of forage harvested by cutting as a percentage of total season yield varies by the number of harvests taken. The mean percentage of total season yield by cutting averaged over all site-years is presented in Table 2.

	1st cut	2nd cut	3rd cut	4th cut	5th cut
3-cut system (N=12 site years)					
Mean	43	31	26		
4-cut system (N=115 site years)					
Mean	36	25	21	18	
5-cut system (4+1 fall) (N=20 site years)					
Mean	31	23	18	16	12

Persistence is influenced over time by the age of the stand, cutting schedule, and environment. For this project, persistence is being measured as a percent of 1st production year dry matter yield. Persistence data in Table 3 consists of 2006 through 2013-seeded fields and is averaged over all cutting schedules. Average forage yield in the 2nd and 3rd production year have been near to the 1st production year. The yield for 4th year stands drops to 78% of the 1st production year. It appears alfalfa is capable of maintaining yield that keeping stands for at least three production years seems to be the prudent decision.

	1st cut	2nd cut	3rd cut	4th cut	Total season
2nd production year stands (n=40 site years)					
Mean	117	109	111	101	102
3rd production year stands (n=25 site years)					
Mean	109	110	97	100	98
4th production year stands (n=11 site years)					
Mean	85	86	93	70	78

Forage Quality

Forage quality, although extremely important, is not the primary focus of this project. However, it is impossible to evaluate changes in management to maximize yield and persistence without considering the impact on forage quality. Total season mean Relative Forage Quality (RFQ) in 2014 was 162, nearly 10 points higher than 2013 but below 2012 and 2011 (Fig. 4). Second-cut was the most problematic harvest in 2014; this is reflected in the 144 RFQ for that cutting. There was also an unusually large cutting interval between first and second cuttings in 2014 (Table 1). In contrast, third-cut had an average RFQ of 192, the highest for that cutting of any previous project year.

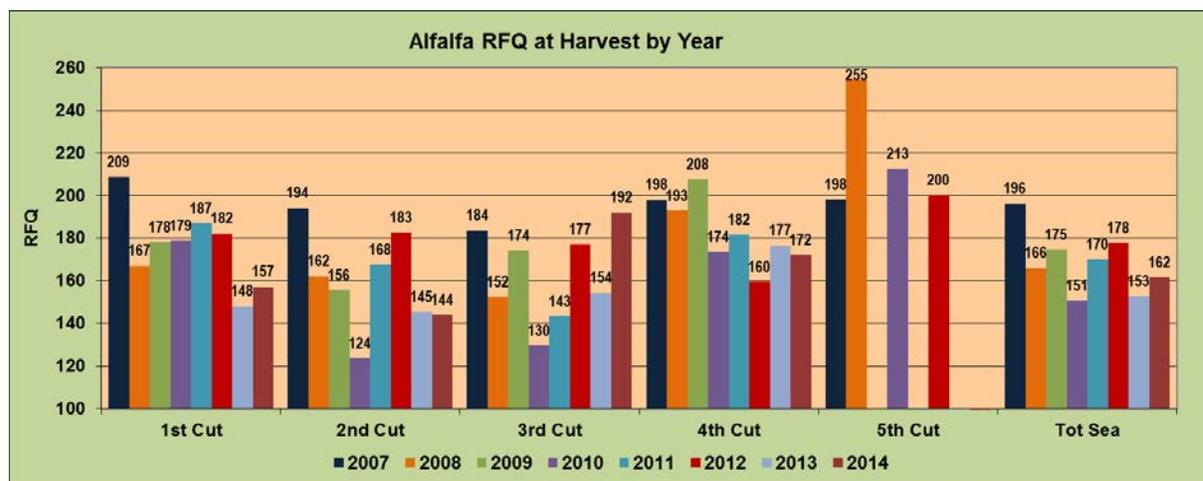


Figure 4. Average alfalfa Relative Forage Quality (RFQ) by cutting and for the total season (2007-2014).

Summary

The Wisconsin Alfalfa Yield and Persistence Program is designed to provide forage growers and agricultural professionals a unique look at what is happening at the farm level. As more fields are entered and years pass, the reliability of information will increase. It's important to keep in mind that only 8 years of data have been collected. Environmental conditions have a profound influence on both yield and quality and during the course of the past 8 years there have been no two exactly alike.

More detailed information and analysis is available in the 2014 project summary available on the UW Team Forage web site at <http://fyi.uwex.edu/forage/alfalfa/>

Acknowledgments

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