WISCONSIN ALFALFA YIELD AND PERSISTENCE (WAYP) PROGRAM
2024 SUMMARY REPORT

Program Objectives:

1. To 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. To quantify decreases in stand productivity of alfalfa fields as they age.
3. To provide an objective dataset to other researchers seeking to answer questions about alfalfa growth, yield, and quality.

2024 Overview:

This summary has now reached eighteen years of project data. UW-Madison Division of Extension educators were asked to identify forage producers willing to weigh and sample forage from 2023-seeded alfalfa fields and continue to do so for the life of the stand. Five new fields were enrolled in the program in 2024 and 11 fields continued from previous years. The current summary includes data for the first, second, third, and fourth production years from fields entered in the program from 2021 through 2024 (2020-2023 seeding). Five fourth-year stands remained in the project, which is fortunate because they are valuable for obtaining long-term data. The fourth production year had only been measured 18 times before this year. As is always the case in these types of studies, there is some attrition of fields over time. This is either because the farmer decided to terminate the field because of winterkill, declining productivity, or critical yield or forage quality data for a cutting or multiple cuttings could not be obtained. This year there were six fields dropped from the project that participated in 2023. All were older stands that were seeded in 2019 or 2020. Production data was collected from 16 fields in 2024 with a total of 5,474 dry matter tons of forage harvested, weighed, and sampled from 1,107 acres. Over 18 years, data was collected from 138 fields with a total of 83,590 dry matter tons of forage harvested, weighed, and sampled from 8,536 acres. Background information of all project fields (current and past) is presented in Table 1. No fields had a fall cut taken in 2024. Fall cuts from 30 fields taken after October 1 are separated from Cuts 1-5 when yield or quality is shown by cut. Generally, the fall cut has a lower yield and higher quality, and this has the possibility of skewing averages as it had been previously included with Cut 4 or Cut 5.

2024 Weather

Spring started with an early snowmelt and warm February and March temperatures. Very little winterkill was observed and much of Wisconsin was under drought conditions. Normal to above normal temperatures in April and May led to timely fieldwork and planting. Near record precipitation from mid-May through early-July delayed harvest and stressed new seeding fields. Conditions then turned drier with July being normal and August to October below normal. This resulted in delayed germination in summer-seeded stands. Temperatures were normal from June through August and much above normal from September through November. This gave established stands time to recover heading into winter. Rain in November helped to alleviate drought conditions that developed during the fall.

2023 Weather

Spring started similar to 2022, with very little winterkill observed after a near record winter snow provided adequate winter cover. Snowmelt recharged the soil and some areas in northern and western Wisconsin experienced flooding. Normal to above normal temperatures in April and May led to timely fieldwork, but cool soil temperatures slowed alfalfa greenup. Conditions turned dry in mid-May with some areas receiving little or no rainfall until July. Precipitation was adequate in July, but dry in many areas from mid- August through September, resulting in challenges for summer-seeded stands. Temperature was average to above average through the summer and wildfire smoke affected air quality in June and July. Fall temperatures remained above average and rainfall in October was welcomed to provide growth and strengthen stands heading into winter.

2022 Weather

Adequate winter snow provided cover and there was very little winterkill observed. A cool, dry April led to a quick start to fieldwork but slowed alfalfa greenup. May temperatures were above normal, but precipitation was still below, and alfalfa seedings were slow to germinate. Mid-summer temperatures and precipitation were near to normal. Temperature and precipitation from August through the fall were above normal, leading to good establishment of summer-seeded alfalfa and good fall growth of established stands. Fields entered winter with near saturated moisture conditions.

2021 Weather

Spring again started with an early snowmelt and cool and dry conditions. This again allowed for timely seeding of alfalfa and other crops but slowed spring alfalfa growth and development. There had been a concern if alfalfa would survive the winter because of a warm fall and green growth into December, but winterkill was not observed in most areas and very light if it was. Temperatures in March and early April were above normal, but late-April and May were below normal. Summer and fall temps were above normal and a widespread killing frost did not happen until October 22. Precipitation varied throughout the state as it usually does. Early spring was generally drier than normal, allowing for timely fieldwork. June and July were also below normal. Heavy rain fell in August across central and eastern Wisconsin while southern areas had near-normal rain. Summer-seeded alfalfa was planted on time and received enough moisture for adequate growth. Fall precipitation was again below normal, allowing for a timely harvest. Most of the state went into winter with depleted subsoil moisture and an "abnormally dry' or 'moderate drought' classification from the U.S. Drought Monitor.

2020 Weather

An early snow melt in March turned into a cool and dry pattern. This allowed for timely seeding of alfalfa and other crops, but slowed spring alfalfa growth and development. Many growers, especially in northeastern Wisconsin experienced winterkill resulting in lost or severely reduced stands. Temperatures in April and May were below normal. Summer temps were above normal, and early fall was slightly below normal. Precipitation varied throughout the state. Early spring was generally drier than normal allowing for timely fieldwork and May through August was mostly normal, enough to provide crop needs and not interfere with timely harvest as in previous years. Some areas started to get dry by mid-summer and fall was normal to below normal. Summer-seeded alfalfa was planted on time and received enough moisture for adequate growth. A warm November (third warmest on record in Arlington) prevented stands from properly hardening off for winter dormancy and green growing plants were still observed in December.

Table 1. Field background information (2017-2024)

Field #	County	Field Size (ac)	Seeding Mo/Yr.	Seeding Rate (lb/ac)	First Production Year	Last Production Year
107	Outagamie	103.7	05/06	15	2007	2009
207	Outagamie	79.3	04/06	16	2007	2009
307	Outagamie	37.0	04/06	16	2007	2010
407	Outagamie	156.7	04/06	16	2007	2009
507	St. Croix	51.0	08/06	NA	2007	2009
607	Waupaca	24.1	04/06	15	2007	2007
707	Fond du Lac	15.7	04/06	17	2007	2007
807	Fond du Lac	39.7	04/06	17	2007	2010
108	Chippewa	18.8	04/07	15	2008	2009
208	Marathon	5.2	04/07	15	2008	2011
308	Winnebago	115	05/07	15	2008	2011
408	Winnebago	36.0	08/07	15	2008	2011
508	Winnebago	22.0	05/07	15	2008	2011
608	Outagamie	83.7	05/07	20	2008	2011
708	Outagamie	147.8	04/07	16	2008	2011
808	Outagamie	53.0	04/07	16	2008	2011
908	Outagamie	50.3	05/07	15	2008	2011

Table 1. Field background information (2017-2024)

Field #	County	Field Size (ac)	Seeding Mo/Yr.	Seeding Rate (lb/ac)	First Production Year	Last Production Year
1008	Outagamie	194.8	08/07	15	2008	2008
109	St. Croix	41	08/08	NA	2009	2011
209	Winnebago	67	04/08	15	2009	2012
309	Winnebago	78	08/08	15	2009	2011
409	Brown	75	08/08	18	2009	2011
509	Chippewa	16.2	04/08	15	2009	2009
609	Calumet	15	04/08	12	2009	2011
709	Outagamie	74.8	05/08	20	2009	2010
809	Outagamie	63	05/08	20	2009	2010
110	Outagamie	48	05/09	16	2010	2010
210	Outagamie	110.2	05/09	16	2010	2012
310	Outagamie	61.7	05/09	16	2010	2012
410	Outagamie	111	05/09	16	2010	2012
510	Fond du Lac	50.3	04/09	17	2010	2012
610	Fond du Lac	19.3	04/09	17	2010	2012
111	Fond du Lac	10	04/10	17	2011	2013
211	Brown	35.7	04/10	17	2011	2012
311	Outagamie	75.8	05/10	20/+4 TF	2011	2011
411	Outagamie	72	05/10	20/+4 TF	2011	2011
112	St. Croix	73.9	08/11	16	2012	2012
212	Kewaunee	73.5	05/11	17	2012	2014
312	Outagamie	143.6	05/11	16	2012	2014
412	Outagamie	75	05/11	16	2012	2014
512	Outagamie	189	05/11	16	2012	2014
612	Outagamie	45.9	05/11	16	2012	2014
712	Outagamie	38.7	05/11	16	2012	2013
812	Dodge	59.6	05/11	16	2012	2013
113	Columbia	44.6	08/12	15	2013	2015
213	Outagamie	150.7	04/12	16	2013	2014
313	Outagamie	54	04/12	16	2013	2014
413	Outagamie	79.3	04/12	16	2013	2014
513	Brown	156	08/12	28	2013	2013
114	Fond du Lac	32.8	04/13	19	2014	2016
214	Fond du Lac	35.7	07/13	17	2014	2016
314	Fond du Lac	9.4	05/13	15	2014	2016
414	Fond du Lac	20.3	05/13	18	2014	2017
514	Kewaunee	32	05/13	21	2014	2016
614	Door	60.8	05/13	18	2014	2016
714	Columbia	9.4	04/13	14	2014	2017
814	Pierce	16.3	09/13	15	2014	2015
914	Marathon	14.2	07/13	12	2014	2015
1014	Marathon	32.5	06/13	15	2014	2016
1114	Outagamie	104.3	05/13	16	2014	2014
1214	Outagamie	156.8	05/13	16	2014	2014
1314	Outagamie	69	06/13	16	2014	2014
1414	Outagamie	38.9	05/13	20/+3.5 TF	2014	2016
1514	Outagamie	76.7	06/13	20/+3.5 TF	2014	2015
115	Manitowoc	19.3	06/14	16	2015	2017

Table 1. Field background information (2017-2024)

Field #	County	Field Size (ac)	Seeding Mo/Yr.	Seeding Rate (lb/ac)	First Production Year	Last Production Year
215	Door	52.0	07/14	18	2015	2016
315	Outagamie	55.7	05/14	16	2015	2016
415	Outagamie	110.2	05/14	16	2015	2016
515	Outagamie	86.5	05/14	16	2015	2018
615	Outagamie	45.8	05/14	16	2015	2016
715	Outagamie	225.0	05/14	16	2015	2016
815	Marathon	11.4	06/14	18	2015	2017
915	Marathon	5.61	06/14	15	2015	2016
1015	Columbia	15.9	04/14	15	2015	2018
116	Marathon	20.0	04/15	12	2016	2017
216	Outagamie	215.7	05/15	16	2016	2016
316	Outagamie	108.6	05/15	16	2016	2016
416	Outagamie	65.0	05/15	16	2016	2016
516	Outagamie	78.2	05/15	16	2016	2016
616	Outagamie	90.0	05/15	16	2016	2016
716	Columbia	11.9	05/15	16	2016	2018
117	Door	48.6	05/16	18	2017	2020
217	Kewaunee	33.7	07/16	20	2017	2019
317	Outagamie	89.6	05/16	16	2017	2019
417	Outagamie	103.4	05/16	16	2017	2018
517	Outagamie	285.3	05/16	16	2017	2019
617	Columbia	16.5	05/16	16	2017	2019
717	Marathon	6.2	05/16	12	2017	2018
817	Marathon	42.4	08/16	12	2017	2018
917	Columbia	16.5	05/16	15	2017	2019
1017	Columbia	16.2	05/16	15	2017	2019
118	Kewaunee	40.0	05/17	18	2018	2019
218	Dane	102.5	08/17	18	2018	2018
318	Dane	52.6	08/17	20	2018	2020
418	Manitowoc	53.9	05/17	18	2018	2018
518	Fond du Lac	38.0	05/17	18	2018	2020
618	Fond du Lac	14.3	08/17	20	2018	2020
718	Fond du Lac	8.0	05/17	17	2018	2020
818	Fond du Lac	58.0	05/17	17	2018	2020
918	Fond du Lac	57.0	05/17	17	2018	2021
1018	Columbia	19.5	08/17	15	2018	2020
1118	Outagamie	57.7	05/17	16	2018	2019
1218	Outagamie	46.7	05/17	16	2018	2018
1318	Outagamie	60.3	05/17	16	2018	2020
1418	Marathon	9.7	08/17	15	2018	2020
119	Columbia	22.3	05/18	16	2019	2021
219	Marathon	10.3	05/18	15	2019	2019
319	Marathon	31.6	05/18	15	2019	2020
419	Marathon	32.5	05/18	15	2019	2019
120	Fond du Lac	11.0	04/19	NA	2020	2022
220	Columbia	32.3	08/19	15	2020	2023
320	Outagamie	46.2	05/19	16	2020	2021
420	Outagamie	68.5	05/19	16	2020	2021

Table 1. Field background information (2017-2024)						
Field #	**County**	**Field Size (ac)**	**Seeding Mo/Yr.**	**Seeding Rate (lb/ac)**	**First Production Year**	**Last Production Year**
520	Kewaunee	57.0	05/19	18/2 RC,2 MF	2020	2020
620	Marathon	8.8	05/19	15	2020	2021
121	Columbia	19.8	04/20	13	2021	2023
221	Oconto	35.7	04/20	14	2021	2023
321	Fond du Lac	52.0	05/21	18	2021	2023
421	Fond du Lac	43.3	04/20	17	2021	active
521	Door	45.0	06/20	17	2021	active
621	Kewaunee	45.0	06/20	20	2021	active
721	Outagamie	182.2	04/20	16	2021	2023
821	Outagamie	53.9	04/20	16	2021	2022
921	Outagamie	16.3	04/20	16	2021	2023
1021	Outagamie	154.4	04/20	16	2021	active
1121	Outagamie	102.4	04/20	16	2021	2023
1221	Outagamie	67.4	04/20	16	2021	active
122	Columbia	31.0	08/21	14	2022	active
123	Columbia	40.3	08/22	15	2023	active
223	Outagamie	76.9	05/22	18, 4% RC	2023	active
323	Outagamie	78.7	05/22	18, 4% RC	2023	active
423	Outagamie	60.0	05/22	18, 4% RC	2023	active
523	Outagamie	138.6	05/22	18, 4% RC	2023	active
124	Columbia	16.5	04/23	17	2024	active
224	Outagamie	53.0	05/23	18	2024	active
324	Outagamie	170.1	05/23	18	2024	active
424	Kewaunee	77.5	07/23	20	2024	active
524	Fond du Lac	11.6	04/23	16	2024	active

Data Collection:
Project fields were identified, and an accurate measure of field size was determined. Forage yield from an entire project field was weighed (usually with an on-farm drive-over scale). Both empty and full weights for all trucks/wagons used were recorded. From 2008 to 2020, two forage samples from each harvest were taken and submitted to the Marshfield Soil and Forage Analysis Laboratory for NIR analysis. (Only one sample was submitted per harvest in 2007.) Samples in 2021 were analyzed by Rock River Laboratory in Watertown and 2022-24 samples were analyzed at the UW Soil and Forage Laboratory in Madison. Results from the two forage samples were averaged and recorded into a spreadsheet by the local coordinator. The data was shared with the producer following each harvest. At the end of the season, all data was collected and summarized for this report.

Harvest Schedules:
Mean cutting dates by year are presented in Table 2 and cutting dates for all project fields harvested in 2024 are presented in Table 3. The 2024 cutting dates for all cuts were later than normal (Table 2). The average date for the first cut was three days later than the eighteen-year average and subsequent cuts were three to seven days later. First cut was delayed by persistent rain and saturated soil conditions even though alfalfa was at optimal quality development in late May. Second cut was also delayed by continued wet conditions and poor field conditions after first cut was taken wet. 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 by the first week of September, except for a few extreme weather years. This is usually necessitated by the impending corn silage harvest and producers not wanting to put the stand at risk with a late September cut. Most fields in this study and all in 2024 were cut four times. Across years and sites and including fall cuts, 35 fields were cut three times, 276 fields were cut four times, and 28 fields were cut five times. A fall cut was taken 30 times.

First cut in 2024 occurred over a 14-day range (May 28 to June 11) (Table 3). Typically, first cut occurred over 20 days because of varying location and weather but ranged from 10 in 2024 to 45 in 2015. Throughout the season, cutting dates are affected by weather and individual producer's decisions, contributing to wider ranges in subsequent cuttings. The average days between cutting for 4-cut fields was 1st to 2nd- 33, 2nd to 3rd- 30, and 3rd to 4th- 27. This was only the second time there were no 3-cut fields, not having happened since 2012. There has not been a 5-cut field since 2018, or a late fall cut field (after October 1) since 2021.

Table 2. Mean cutting dates by year

Year	1st Cut Date	2nd Cut Date	3rd Cut Date	4th Cut* Date	5th Cut Date	Fall Cut Date
2007	22-May	24-Jun	25-Jul	30-Aug		21-Oct
2008	3-Jun	2-Jul	1-Aug	30-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		21-Oct
2012	16-May	14-Jun	14-Jul	10-Aug	30-Aug	2-Oct
2013	10-Jun	11-Jul	6-Aug	7-Sep		
2014	4-Jun	9-Jul	7-Aug	13-Sep		
2015	3-Jun	2-Jul	3-Aug	27-Aug	12-Sep	
2016	29-May	26-Jun	26-Jul	19-Aug	1-Sep	1-Oct
2017	30-May	2-Jul	1-Aug	29-Aug		
2018	30-May	27-Jun	28-Jul	3-Sep	14-Sep	
2019	7-Jun	10-Jul	9-Aug	6-Sep		8-Oct
2020	3-Jun	4-Jul	4-Aug	1-Sep		5-Oct
2021	29-May	27-Jun	27-Jul	26-Aug		11-Oct
2022	31-May	27-Jun	26-Jul	26-Aug		
2023	25-May	20-June	21-Jul	22-Aug		
2024	2-Jun	4-Jul	5-Aug	1-Sep		
MEAN	**30-May**	**29-Jun**	**30-Jul**	**29-Aug**	**6-Sep**	**12-Oct**

Table 3. Summary of 2024 Cutting Dates

Field ID#	County	1st Cut Date	2nd Cut Date	3rd Cut Date	4th Cut Date	5th Cut Date	Fall Cut Date
421	Fond du Lac	28-May	30-Jun	7-Aug	6-Sep		
521	Door	29-May	9-Jul	7-Aug	10-Sep		
621	Kewaunee	6-Jun	9-Jul	9-Aug	4-Sep		
1021	Outagamie	5-Jun	10-Jul	9-Aug	3-Sep		
1221	Outagamie	9-Jun	11-Jul	9-Aug	3-Sep		
122	Columbia	29-May	27-Jun	28-Jul	26-Aug		
123	Columbia	30-May	30-Jun	28-Jul	27-Aug		
223	Outagamie	4-Jun	9-Jul	7-Aug	1-Sep		
323	Outagamie	4-Jun	9-Jul	7-Aug	1-Sep		
423	Outagamie	4-Jun	10-Jul	8-Aug	2-Sep		
523	Outagamie	6-Jun	10-Jul	8-Aug	2-Sep		
124	Columbia	29-May	27-Jun	28-Jul	27-Aug		
224	Outagamie	5-Jun	10-Jul	8-Aug	2-Sep		
324	Outagamie	5-Jun	10-Jul	9-Aug	3-Sep		
424	Kewaunee	11-Jun	11-Jul	9-Aug	2-Sep		
524	Fond du Lac	29-May	29-Jun	29-Jul	2-Sep		
MEAN		**2-Jun**	**6-Jul**	**5-Aug**	**1-Sep**		
EARLIEST		**28-May**	**27-Jun**	**28-Jul**	**26-Aug**		
LATEST		**11-Jun**	**11-Jul**	**9-Aug**	**10-Sep**		

Forage Dry Matter at Harvest:
Alfalfa was harvested as haylage for all but 23 individual cuttings over the eighteen years. Harvest dry matter percent data from the dry hay harvests was 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 bunkers, piles, or bags.

Throughout the duration of this project total season dry matter percentage of harvested forage has ranged from 40 to 50% (Figure 1), though individual cuttings and total-season field means sometimes exceeded 50%, especially later in the season. It's been questioned if this is too dry for obtaining optimum storage porosity in a bunker or pile, but the continuous occurrence supports that stored forage quality is not negatively affected, or producers would adjust harvest practices. The overall season average is similar to the individual cut averages, which ranged from 44 to 46%. Cut 1, 2, 4 and season dry matter percent were similar to the long-term averages. Cut 3 was three percent wetter than normal and the fourth wettest in eighteen years. The 2024 season average dry matter was 45% and ranged from 39 to 52% for individual fields.

Two fields finished the season with a total-season dry matter mean under 40% and one field was above 50%. Normally, first cut tends to be harvested at lower dry matter than other cuts because drying weather improves through the season. Harvest moisture in 2024 was affected by soil moisture and weather. The distribution of individual cut dry matter percentage for 64 cuts from 2024 is shown in Figure 1A. Overall it is a normal distribution although each cut tended to skew drier or wetter. Most cuts were harvested between 40 and 50% DM, but over one third were still harvested outside this range. This was consistent across the season with five to eight fields outside the range for each cut. This chart shows the difficulty of harvesting alfalfa haylage in the ideal moisture range.

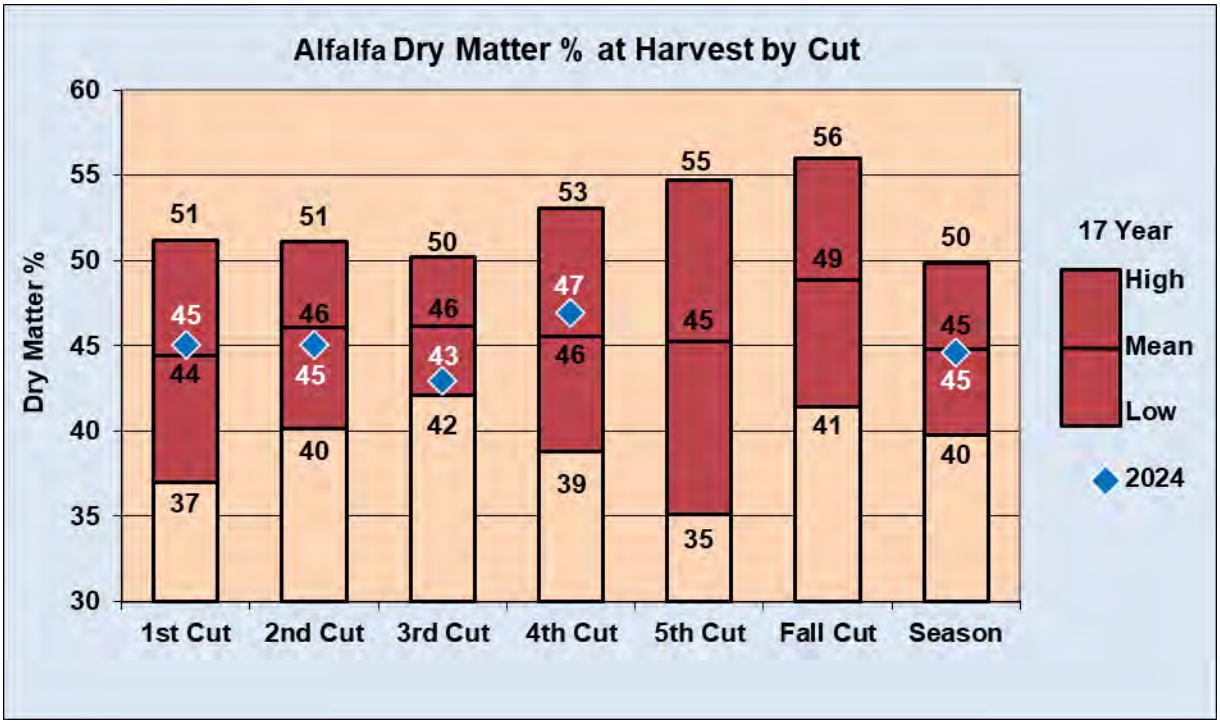

Figure 1. Average dry matter of harvested forage by cutting and as a weighted average for the total season (2007-2024).

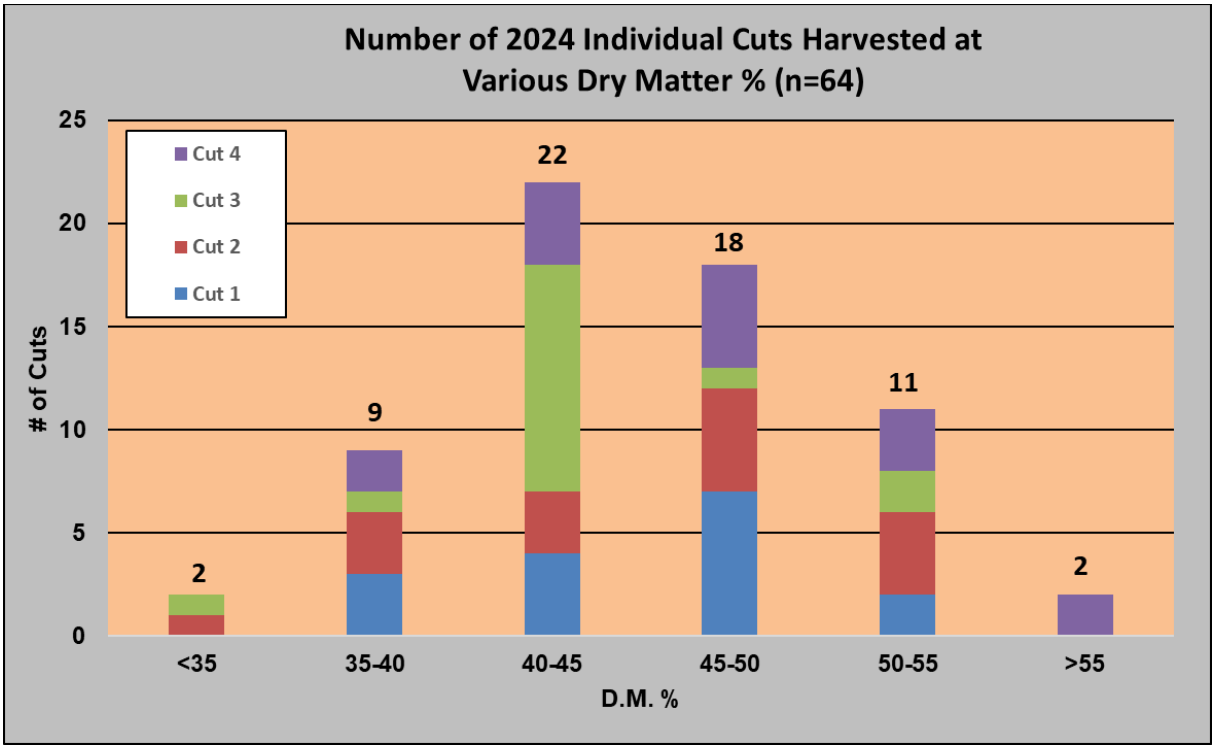

Figure 1A. Number of 2024 individual cuts harvested at various dry matter % (n=64).

Season Forage Dry Matter Yield:
Average yield by cutting and for the season in each project year are presented in Figure 2. The highest average dry matter yields of over 5.0 tons per acre were obtained in 2007, 2010, and now 2024. The lowest average dry matter yields were in 2013 and 2020 at just over 3.6 tons per acre.

The mean yield across all fields was 5.13 tons per acre in 2024, setting a record for best yield in the eighteen years of the study. First-cut yield of 2.08 tons per acre also set a record and was 0.24 tons per acre more than the previous high in 2016. Cut 2 yield was the third-highest seen, trailing only 2007 and 2010. Cut 3 yield was 0.10 tons per acre above average and Cut 4 was near average. Frequent rainfall and muddy fields from mid-May to early July delayed harvest, resulting in increased yields. Detailed yield data for each field by year are presented in Appendix A.

Once again there was a variation between fields (Figure 3A). Yields ranged from a high of 6.57 to a low of 4.23 tons per acre. This difference of 2.44 tons is the second narrowest range. Previously there has been a 3.18 ton per acre average range with the widest margin being 3.78 in 2013 and the narrowest at 2.19 in 2022.

The highest yielding field at 6.57 tons per acre ranked 2nd of 343 fields harvested over 18 years. The record high of 6.60 was set in 2021. This field was the last field standing in the area with a first cut of June 11. Cut 1 yield of 2.59 tons was the fourth best in the study. Two fields exceeded 6.0 tons per acre in 2024, the benchmark for top yields in the study, having only been reached 15 times in 18 years (Figure 3B). No fields were below 3.0 tons per acre in 2024. That level has been reached by 24 fields in 18 years. This was also the first time an individual field didn't yield below 4.0 tons per acre (Appendix A).

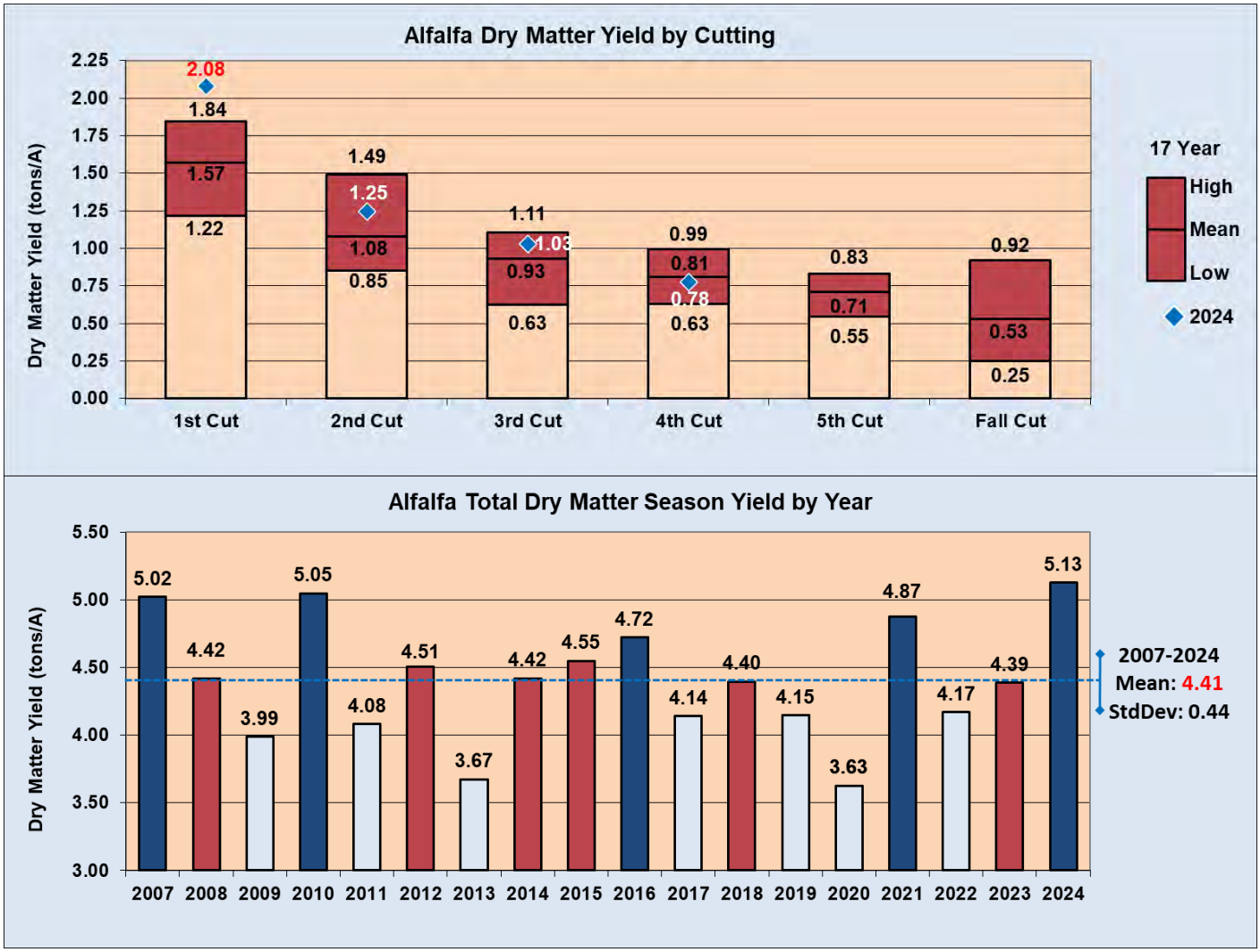

Figure 2. Average dry matter yield by cutting and for the total season yield by year. (2007-24)

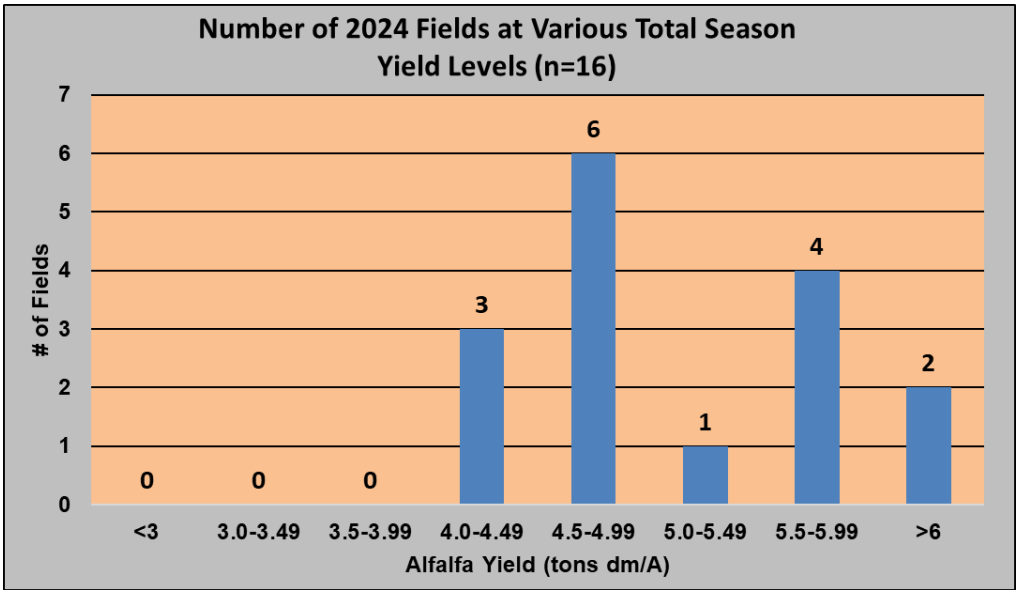

Figure 3A. Number of 2024 fields at various total season dry matter yield levels (n=16).

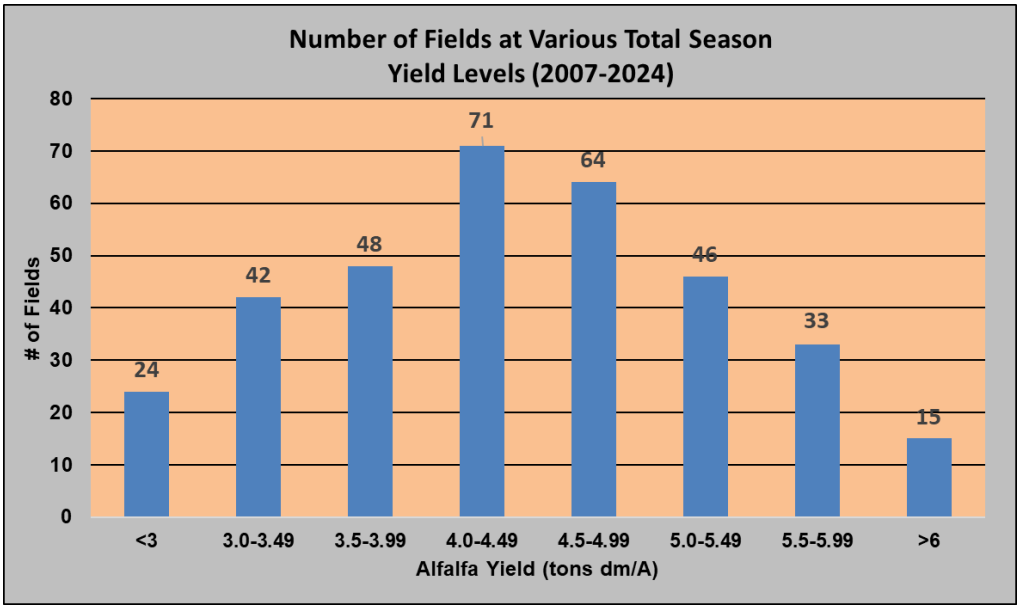

Figure 3B. Number of 2007-2024 fields at various total season dry matter yield levels (n=343).

Cumulative Forage Dry Matter Yield:

Yield attained over the life of the alfalfa stand is also summarized in addition to annual yield. The total stand yield has been broken down by the number of production years for the 134 fields that have complete data (Table 4). Fields still active were included with the current number of seasons. Table 5 shows the top five yielding fields by number of seasons. This summary categorizes a field several ways to look at best years individually as well as over the best two to four consecutive years of the stand. County, years in the project, and annual cut schedule are shown in addition to dry matter yield. An "x" in the cut schedule signifies harvest years that were not included in the yield total. The only new addition was a Kewaunee County field that yielded 6.57 tons per acre in its first year.

Table 4. Summary of overall field yield by number of seasons of the stand. (tn dm/A)

Seasons	Cuts	Fields	Mean	Min	Max
4	13-17	22	17.98	11.77	21.84
3	10-14	74	13.58	8.91	18.07
2	6-9	108	8.92	5.88	12.80
1	3-5	134	4.47	1.61	6.60

Table 5. Top overall yielding fields by number of seasons of the stand. (tn dm/A)

Seasons	Field ID	County	Years	Cut Schedule	Yield
4	714	Columbia	2014-2017	4,4,4,4	21.84
4	414	Fond du Lac	2014-2017	4,4,4,4	21.12
4	1015	Columbia	2015-2018	4,4,4,4	21.09
4	807	Fond du Lac	2007-2010	4,4,4,4	20.47
4	608	Outagamie	2008-2011	4,4,4,4	20.41
3	114	Fond du Lac	2014-2016	4,4,4	18.07
3	111	Fond du Lac	2011-2013	4,4,4	17.16
3	618	Fond du Lac	2018-2020	4,4,4	16.88
3	608	Outagamie	2008-2011	4,4,4,x	16.87
3	716	Columbia	2016-2018	4,4,4	16.73

2	111	Fond du Lac	2011-2013	4,4,x	12.80
2	114	Fond du Lac	2014-2016	4,4,x	12.25
2	618	Fond du Lac	2018-2020	4,4,x	12.09
2	114	Fond du Lac	2014-2016	x,4,4	11.77
2	807	Fond du Lac	2007-2010	4,4,x,x	11.59
1	921	Outagamie	2021-2022	4F,x,x	6.60
1	424	Kewaunee	2024	4	6.57
1	111	Fond du Lac	2011-2013	x,4,x	6.55
1	618	Fond du Lac	2018-2020	x,4,x	6.40
1	114	Fond du Lac	2014-2016	4,x,x	6.30

Alfalfa Persistence:

In-season: An analysis was done to determine the percent of total season yield for each cutting (Table 6). Data was summarized for 3-, 4-, and 5-cut systems for all project years. Fall-cut fields were also included in the 4-cut summary with the final fall harvest not included in the total season yield. It's significant to note the wide variation in percent yield for an individual cutting. In some cases, this is the result of environmental conditions (e.g. drought) previous to the harvest while in other situations it's simply a function of cutting date (Tables 2 and 3). The sixteen 4-cut fields in 2024 had a greater proportion of yield in the 1st cut compared to the study mean because of the record yield. 2nd and 3rd cuts were near the mean. 4th cut had less than the mean because many areas were becoming dry, and the harvest window was shorter because corn silage harvest was near. Figure 2 previously showed that 1st cut yield was the highest seen by 0.24 tons. No fields were cut three or five times in 2024.

Table 6. Average percent of total season yield by cutting for 3, 4 and 5 cut harvest systems* (2007-24)

3-cut system (3, 4-Fall) (n=44 site years)

	1st cut	2nd cut	3rd cut
2024	47	30	23
Mean	46	28	26
Low	26	15	13
High	72	43	49

4-cut system (4, 3+Fall, 5-Fall) (n=285 site years)

	1st cut	2nd cut	3rd cut	4th cut
2024	41	24	20	15
Mean	36	25	21	18
Low	20	12	5	5
High	58	42	36	34

5-cut system (5, 4+Fall) (n=28 site years)

	1st cut	2nd cut	3rd cut	4th cut	5th cut
2024	-	-	-	-	-
Mean	32	21	18	16	13
Low	21	11	10	9	6
High	41	39	26	24	18

* high and low figures are for individual cuttings and will not add to 100%

Between years: Persistence is influenced over time by the age of the stand, cutting schedule, and environment. For this project, persistence is being measured as a percentage of 1st production year dry matter yield. Persistence data in Table 7 consists of 2006 through 2022-seeded fields and is averaged over all cutting schedules. Although ranges indicate a wide variation, average forage yield in the second (102%) and third (94%) production year have been comparable to the 1st production year. The yield for fourth year stands drops to 86% of the first production year. This number previously was 81% from 18 fields. Five fourth-year fields

averaged 103% of their first-year yield and boosted the overall average. To date it appears that keeping stands for at least three production years after the seeding year seems to be a prudent decision, but the condition and productivity of individual fields are the most important factors in determining when to rotate to a different crop. The numbers could also be somewhat misleading because not all fields are kept for a full 3- or 4-year production cycle. Those that are removed earlier at the producer's discretion no longer generate data which would likely result in lower averages. Therefore, this should be viewed as data from fields that producer's judge good enough to keep.

Table 7. Percent of 1st production year yield by cutting and total season for 2nd, 3rd, and 4th production year stands. (2007-24)

2nd Production Year Stands (n=110 site years)

	1st cut	2nd cut	3rd cut	4th cut	Season
2024	121	140	145	60	115
Mean	111	106	112	102	**102**
Low	44	39	23	39	63
High	275	291	491	279	236

3rd Production Year Stands (n=76 site years)

	1st cut	2nd cut	3rd cut	4th cut	Season
2024	113	114	119	61	100
Mean	100	101	99	99	**94**
Low	34	43	32	23	63
High	250	299	370	172	183

4th Production Year Stands (n=23 site years)

	1st cut	2nd cut	3rd cut	4th cut	Season
2024	114	104	125	94	103
Mean	89	86	107	86	**86**
Low	38	34	36	23	37
High	150	151	321	148	139

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. The overall harvested relative forage quality (RFQ) of 165 in the 2024 season was 9 points below average and the sixth lowest seen in 18 years (Figure 7). Results of the four cuts ranged from 136 to 233, reflecting the challenges with the 2024 crop. Cut 1 set a record low at 136 because harvest was delayed by wet conditions while Cut 4 set a record high, Cut 2 was below average while Cut 3 was the fifth best seen. Individual field season average RFQs ranged from 136 to 188. Alfalfa quality is usually inversely related to yield. This was especially evident with Cuts 1 and 2 having excellent yields and poor-quality forage.

Other notable forage quality results from 2024 include:

- Season crude protein (CP) percent was the fifth lowest seen at 20.8 (Figure 4). Cut 1was the fourth lowest and Cut 2 set a record low. Cut 3 was slightly below average, while Cut 4 was the fourth best.
- NDF percent was the highest season average seen at 41.5, slightly more than 2017. Cut 1 was also a record high. Cut 2 was the fourth highest seen while Cuts 3 and 4 were below average (Figure 5).
- NDFD percent was the fourth most for the season (Figure 6). Cut 4 set a record high, slightly above 2020. Cut 3 was the second highest seen, trailing only 2020.
- Milk/Ton was also the fourth most for the season. Cuts 3 and 4 set records (Figure 8) with the previous records being from 2021. Cut 2 ranked fourth while Cut 1 was fourth lowest.

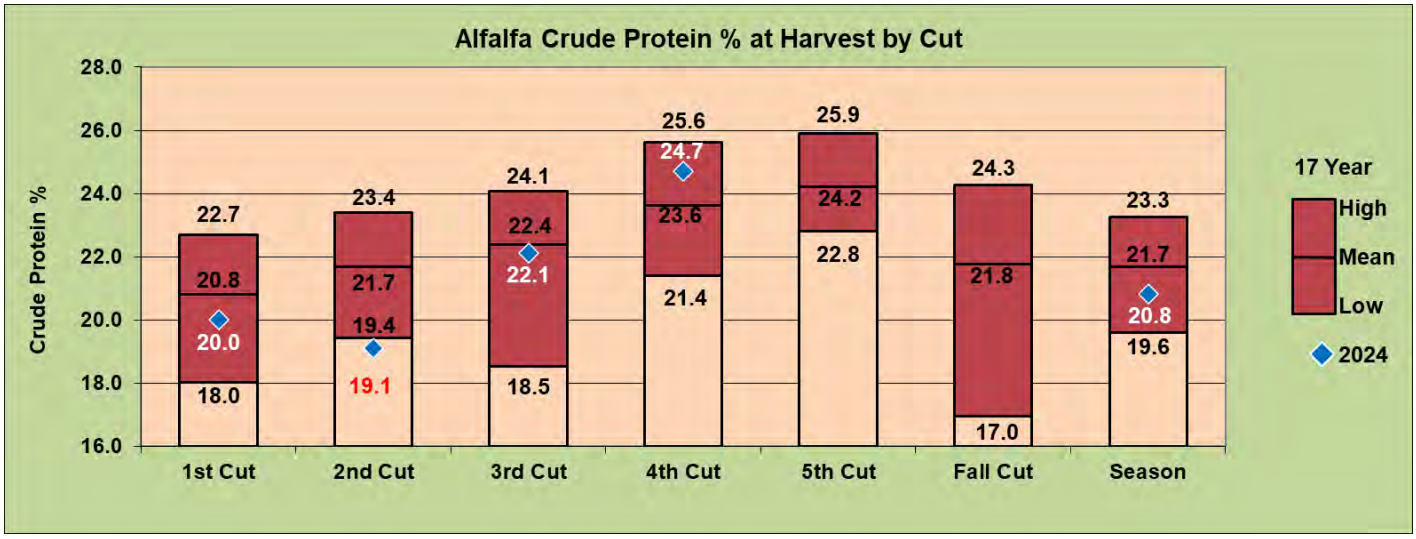

Figure 4. Average crude protein percent by cutting and weighted average for the total season (2007-2024).

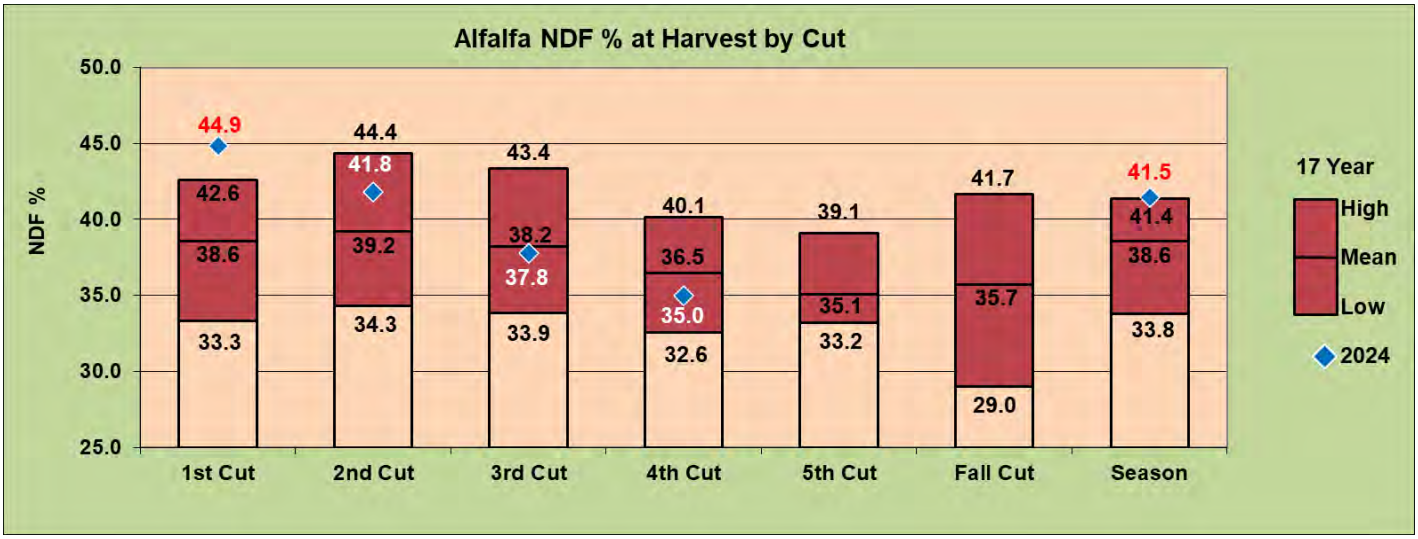

Figure 5. Average NDF percent by cutting and weighted average for the total season (2007-2024).

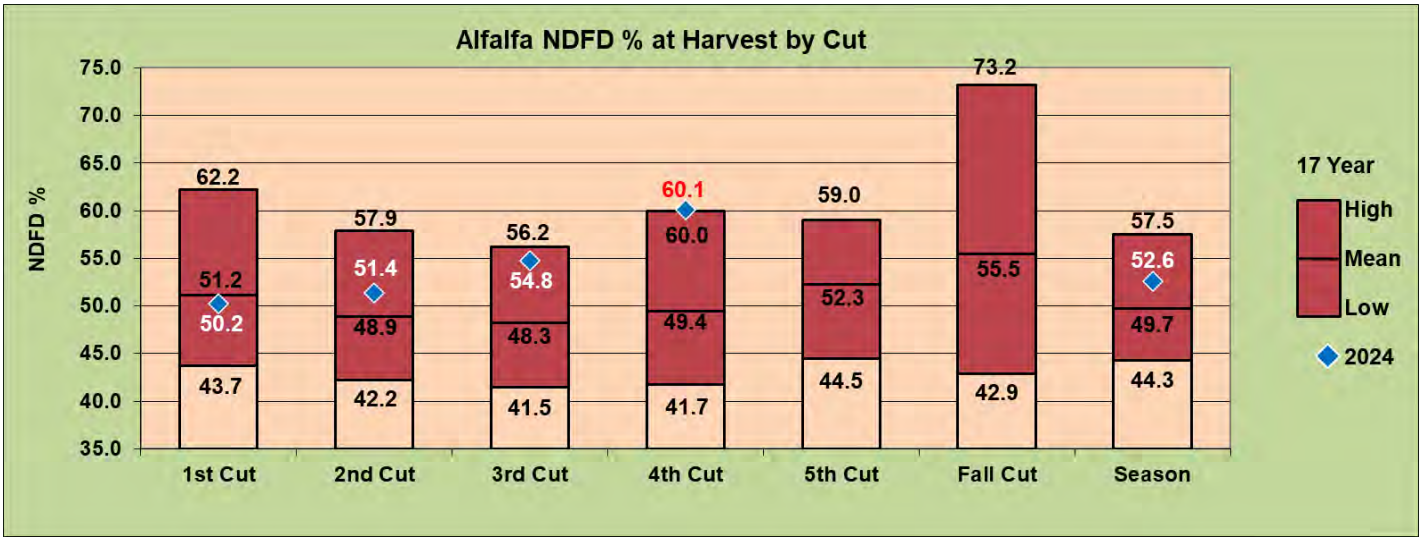

Figure 6. Average NDFD percent by cutting and weighted average for the total season (2007-2024).

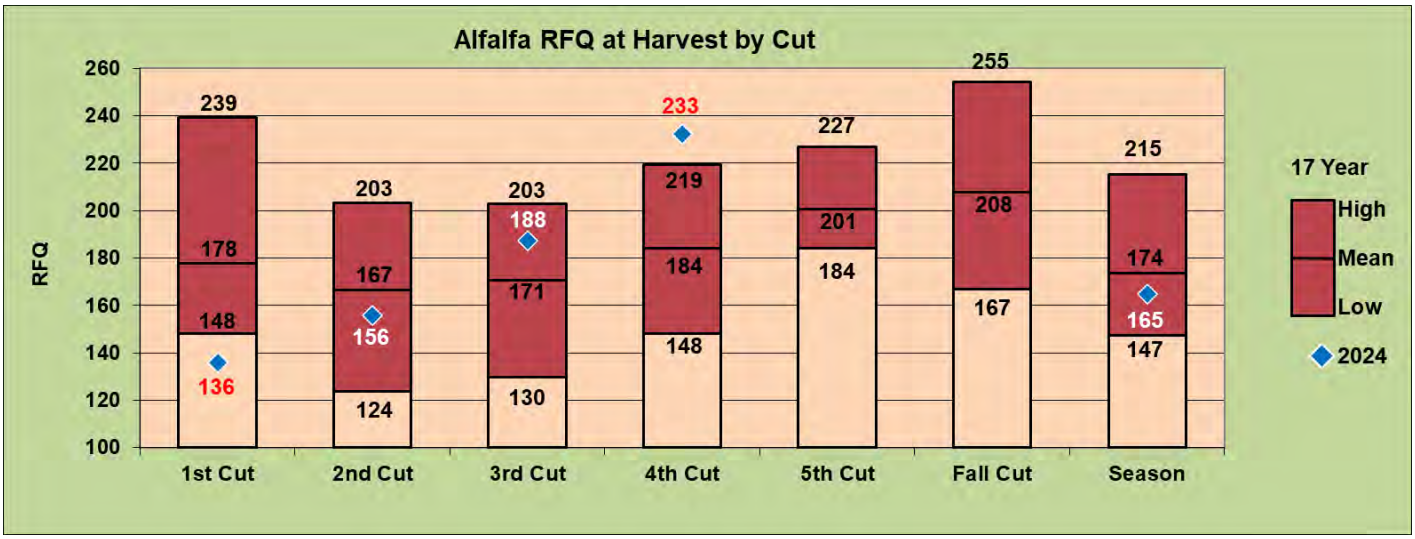

Figure 7. Average Relative Forage Quality (RFQ) by cutting and weighted average for the total season (2007-2024).

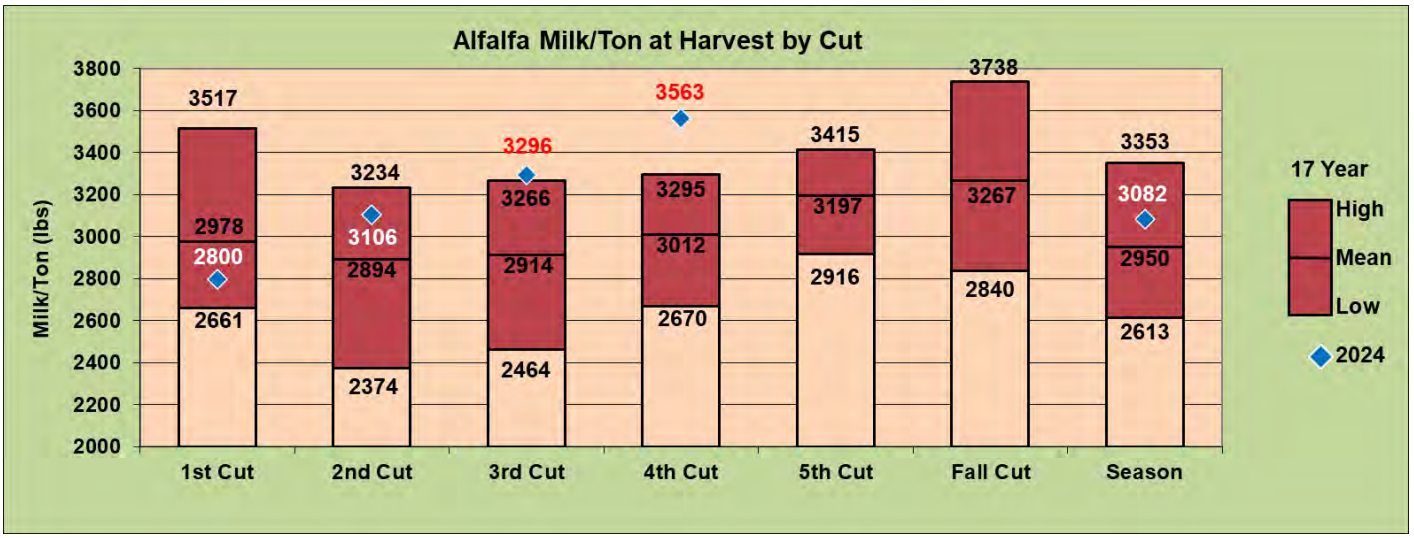

Figure 8. Average Milk per Ton by cutting and weighted average for the total season (2007-2024).

Summary:
The Wisconsin Alfalfa Yield and Persistence Program is designed to provide forage growers, agricultural professionals, researchers, and the forage industry with a unique look at what is happening at the farm level. As more fields are entered and years pass, the reliability of information continues to increase. Environmental conditions have had a profound influence on both yield and quality with some years being similar, but no two years being exactly alike. Growers in 2024 experienced an overall record yield, with individual cut yields varying based on weather. Early cut yield was excellent, but quality was poor as producers struggled with delayed harvest and muddy fields. Later cuts had excellent quality, but normal yields. It is important to characterize these differences to know what has happened in the past and to plan for future years.

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Greg Blonde, Waupaca County	Bryce Larson, Calumet County
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This report was written and data compiled by Mike Bertram, Superintendent, UW Arlington Agricultural Research Station. Questions may be directed to: mbertram@wisc.edu Reports from 2007-2014 were written by Mike Rankin, Emeritus Crops and Soils Agent, Fond du Lac County.

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
107	2007	1.57	1.53	0.95	0.59		0.34	4.98
207	2007	1.52	1.33	1.00	0.70		0.73	5.27
307	2007	1.54	1.51	1.30	0.90		0.88	6.12
407	2007	1.41	1.57	1.11	0.80		0.71	5.59
507	2007	1.00	1.02	0.37				2.39
607	2007	1.79	1.77	1.20	1.14			5.90
707	2007	1.75	1.23	0.81	0.63			4.41
807	2007	1.79	1.19	1.42	1.10			5.51
Mean	**2007**	**1.55**	**1.39**	**1.02**	**0.84**		**0.67**	**5.02**
Low	**2007**	**1.00**	**1.02**	**0.37**	**0.59**		**0.34**	**2.39**
High	**2007**	**1.79**	**1.77**	**1.42**	**1.14**		**0.88**	**6.12**
107	2008	1.28	1.11	1.07	0.43			3.89
207	2008	1.34	1.08	1.14	0.68			4.23
307	2008	NA	0.86	0.91	0.78			---
407	2008	NA	1.14	1.09	0.68			---
507	2008	1.95	1.08	0.76				3.79
807	2008	2.23	1.73	1.31	0.82			6.08
108	2008	1.38	0.74	1.15				3.27
208	2008	2.08	1.54	0.84				4.46
308	2008	1.46	0.83	1.27	0.93		0.45	4.95
408	2008	0.86	0.49	0.85	0.50			2.70
508	2008	2.01	0.72	1.20	0.98		0.37	5.29
608	2008	1.39	1.78	1.54	0.92			5.63
708	2008	1.28	1.05	1.18	0.89			4.40
808	2008	1.81	1.20	1.27	0.79			5.07
908	2008	0.73	0.94	0.89	1.12			3.68
1008	2008	NA	1.06	0.97	0.83			---
Mean	**2008**	**1.52**	**1.08**	**1.09**	**0.80**		**0.41**	**4.42**
Low	**2008**	**0.73**	**0.49**	**0.76**	**0.43**		**0.37**	**2.70**
High	**2008**	**2.23**	**1.78**	**1.54**	**1.12**		**0.45**	**6.08**
107	2009	0.95	1.06	0.30	0.99			3.31
207	2009	1.28	1.23	0.53	1.00			4.04
307	2009	1.02	1.23	0.69	0.93			3.87
407	2009	1.59	1.02	0.53	0.85			3.99
507	2009	1.38	0.90	0.49	0.76			3.53
807	2009	1.56	0.99	0.98	0.62			4.15
108	2009	1.52	0.83	0.80				3.15
208	2009	1.77	1.18	1.33				4.28
308	2009	1.24	0.94	0.56	1.15			3.89
408	2009	1.80	0.80	0.20	0.64			3.43
508	2009	1.74	1.00	0.59	0.98			4.32
608	2009	2.19	1.23	0.88	0.78			5.07
708	2009	1.40	1.34	0.63	0.98			4.35
808	2009	2.07	1.16	0.59	0.55			4.37
908	2009	1.88	0.99	0.30	0.95			4.13
109	2009	0.57	0.55	1.09				2.21
209	2009	1.92	1.60	0.69	1.06			5.27
309	2009	1.14	0.84	0.43	1.05			3.46
409	2009	1.45	1.24	0.35	0.32			3.37
509	2009	2.05	0.88	0.57				3.49
609	2009	2.36	0.58	0.20	0.95			4.10

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
709	2009	2.27	1.25	0.82	0.92			5.26
809	2009	2.08	1.03	0.85	0.72			4.68
Mean	**2009**	**1.62**	**1.04**	**0.63**	**0.85**			**3.99**
Low	**2009**	**0.57**	**0.55**	**0.20**	**0.32**			**2.21**
High	**2009**	**2.36**	**1.60**	**1.33**	**1.15**			**5.27**
307	2010	1.16	1.24	1.24	0.52			4.17
807	2010	1.38	1.32	1.22	0.81			4.74
208	2010	1.99	1.65	1.26			0.62	5.52
308	2010	1.65	1.66	0.85	0.41			4.57
408	2010	1.85	1.46	0.76	0.51			4.58
508	2010	1.88	1.81	0.69	0.48			4.86
608	2010	2.09	1.79	1.46	0.82			6.16
708	2010	1.45	1.33	1.39	0.67			4.84
808	2010	1.66	1.77	1.57	0.90			5.91
908	2010	1.83	0.84	1.27	0.51			4.45
109	2010	1.57	1.42	0.90	1.33			5.23
209	2010	1.91	1.80	1.09	0.91			5.71
309	2010	2.16	1.85	0.91	0.70			5.61
409	2010	1.43	0.96	0.55			0.39	3.33
609	2010	2.34	1.78	1.05	1.00			6.17
709	2010	2.32	0.94	1.08	0.57			4.90
809	2010	1.86	1.67	1.07	0.47			5.07
110	2010	1.46	1.65	1.40	0.54			5.05
210	2010	2.07	1.76	0.94	0.51			5.28
310	2010	1.59	1.21	0.97	0.57			4.33
410	2010	2.00	1.26	0.94	0.41			4.61
510	2010	1.87	1.69	1.05	0.62		0.39	5.62
610	2010	2.08	1.40	1.09	0.46		0.34	5.37
Mean	**2010**	**1.81**	**1.49**	**1.08**	**0.65**		**0.44**	**5.05**
Low	**2010**	**1.16**	**0.84**	**0.55**	**0.41**		**0.34**	**3.33**
High	**2010**	**2.34**	**1.85**	**1.57**	**1.33**		**0.62**	**6.17**
208	2011	0.78	0.90	1.05			0.45	3.18
308	2011	1.31	1.12	0.85	0.79			4.06
408	2011	1.19	0.72	0.67	0.51			3.09
508	2011	1.25	0.85	0.65	0.69			3.44
608	2011	1.10	0.83	1.16	0.45			3.54
708	2011	1.50	0.75	1.37	0.78			4.41
808	2011	1.07	0.65	1.15	0.90			3.77
908	2011	0.92	0.52	0.87	0.49			2.80
109	2011	1.29	0.97	1.03	0.76			4.05
209	2011	1.59	1.02	0.92	0.92			4.45
309	2011	1.53	1.15	1.14	0.95			4.77
409	2011	1.27	0.81	0.47	0.48			3.03
609	2011	1.76	0.90	1.68	0.78			5.12
210	2011	1.13	0.72	1.04	0.80			3.69
310	2011	1.25	0.63	0.97	0.78			3.63
410	2011	1.33	0.60	1.08	0.57			3.58
510	2011	1.47	1.08	1.07	0.73			4.35
610	2011	1.41	0.92	0.88	0.83			4.04
111	2011	2.45	1.29	1.32	1.19			6.26
211	2011	1.39	0.85	1.20	1.10			4.55
311	2011	2.30	0.94	1.66	1.00			5.90
411	2011	1.70	NA	1.68	0.64			---

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
Mean	**2011**	**1.41**	**0.87**	**1.09**	**0.77**		**0.45**	**4.08**
Low	**2011**	**0.78**	**0.52**	**0.47**	**0.45**		**0.45**	**2.80**
High	**2011**	**2.45**	**1.29**	**1.68**	**1.19**		**0.45**	**6.26**
209	2012	1.47	1.01	0.97	0.40			3.85
210	2012	1.46	0.75	0.43	0.80		0.76	4.20
310	2012	1.22	0.67	0.45	0.69		0.45	3.48
410	2012	1.14	0.62	0.38	0.66		0.56	3.36
510	2012	1.20	1.13	0.74	0.63	0.73		4.44
610	2012	2.33	1.18	1.12	0.66			5.30
111	2012	2.03	1.79	1.55	1.18			6.55
211	2012	1.11	1.10	0.78	0.79	0.48		4.26
112	2012	1.46	0.85	1.11	0.85	0.63		4.90
212	2012	1.74	1.21	1.32	1.27			5.55
312	2012	1.65	0.78	0.59	0.70		0.68	4.40
412	2012	2.06	0.81	0.64	0.86		0.64	5.00
512	2012	1.33	0.88	0.66	0.55		0.34	3.76
612	2012	0.84	0.63	0.88	0.93		0.58	3.86
712	2012	1.30	0.94	0.65	0.69		0.72	4.31
812	2012	1.02	1.88	0.84	0.78	0.34		4.86
Mean	**2012**	**1.46**	**1.01**	**0.82**	**0.78**	**0.55**	**0.59**	**4.51**
Low	**2012**	**0.84**	**0.62**	**0.38**	**0.40**	**0.34**	**0.34**	**3.36**
High	**2012**	**2.33**	**1.88**	**1.55**	**1.27**	**0.73**	**0.76**	**6.55**
111	2013	1.70	0.85	0.87	0.94			4.35
212	2013	1.89	1.47	1.06	0.99			5.40
312	2013	1.20	1.02	0.65	0.48			3.35
412	2013	1.26	1.16	0.74	0.63			3.79
512	2013	1.30	1.11	0.80	0.65			3.87
612	2013	0.86	0.86	0.63	0.43			2.78
712	2013	0.83	1.03	0.65	0.44			2.95
812	2013	1.94	1.26	1.03	0.84			5.07
113	2013	2.27	1.80	1.19				5.26
213	2013	0.82	1.08	0.62	0.76			3.28
313	2013	0.82	0.83	0.51	0.60			2.76
413	2013	0.92	1.11	0.72	0.50			3.25
513	2013	0.47	0.40	0.44	0.30			1.62
Mean	**2013**	**1.25**	**1.08**	**0.76**	**0.63**			**3.67**
Low	**2013**	**0.47**	**0.40**	**0.44**	**0.30**			**1.62**
High	**2013**	**2.27**	**1.80**	**1.19**	**0.99**			**5.40**
212	2014	1.76	1.53	0.77	0.88			4.93
312	2014	1.69	0.97	0.70	0.80			4.16
412	2014	1.56	0.89	0.75	0.70			3.90
512	2014	1.48	0.59	0.76	0.65			3.48
612	2014	1.41	0.66	0.54	0.59			3.20
113	2014	1.80	1.70	1.24	1.03			5.79
213	2014	1.39	0.51	0.64	1.05			3.58
313	2014	1.09	0.53	0.66	0.84			3.13
413	2014	1.87	0.68	0.67	0.90			4.12
114	2014	1.93	1.88	1.24	1.25			6.28
214	2014	1.49	1.77	1.36	0.88			5.50
314	2014	1.88	1.14	1.02	0.73			4.77
414	2014	1.74	1.99	1.19	1.09			6.02

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
514	2014	1.77	0.89	0.55	0.75			3.95
614	2014	2.13	0.88	0.35	0.73			4.09
714	2014	2.96	1.24	1.02	0.91			6.12
814	2014	1.42	1.22	0.42	0.70			3.75
914	2014	1.18	1.20	0.93				3.31
1014	2014	2.04	1.58	1.20				4.82
1114	2014	1.42	0.73	0.76	0.74			3.65
1214	2014	1.23	0.54	0.95	0.70			3.42
1314	2014	1.20	0.49	0.88	0.83			3.39
1414	2014	1.28	1.93	0.72	1.31			5.23
1514	2014	1.87	1.24	0.81	1.58			5.50
Mean	**2014**	**1.65**	**1.12**	**0.84**	**0.89**			**4.42**
Low	**2014**	**1.09**	**0.49**	**0.35**	**0.59**			**3.13**
High	**2014**	**2.96**	**1.99**	**1.36**	**1.58**			**6.28**
113	2015	1.59	1.50	1.61	0.85			5.55
114	2015	1.87	1.60	1.46	1.02			5.95
214	2015	1.25	0.88	0.88	0.72	0.66		4.40
314	2015	1.76	1.15	0.95	0.75			4.61
414	2015	1.67	1.60	1.24	0.64			5.14
514	2015	1.25	1.84	1.17				4.26
614	2015	2.89	1.21	0.86	0.70			5.67
714	2015	1.29	0.99	1.63	0.89			4.80
814	2015	1.30	0.77	0.95	0.35			3.37
914	2015	2.26	0.73	1.00				3.99
1014	2015	2.39	0.62	1.11				4.12
1414	2015	2.04	1.26	0.95	0.82			5.06
1514	2015	2.03	1.14	1.03	0.84			5.03
115	2015	1.16	1.30	0.87	0.77			4.10
215	2015	1.65	1.10	0.70				3.45
315	2015	1.53	0.76	1.19	1.07			4.55
415	2015	1.90	0.81	0.98	0.76			4.45
515	2015	1.98	0.91	1.02	0.76			4.66
615	2015	1.20	0.69	0.57	0.29			2.74
715	2015	1.51	0.83	0.95	0.63			3.92
815	2015	1.83	1.17	0.91				3.90
915	2015	2.33	1.05	1.91				5.28
1015	2015	1.81	1.36	1.49	0.95			5.60
Mean	**2015**	**1.76**	**1.10**	**1.11**	**0.75**	**0.66**		**4.55**
Low	**2015**	**1.16**	**0.62**	**0.57**	**0.29**	**0.66**		**2.74**
High	**2015**	**2.89**	**1.84**	**1.91**	**1.07**	**0.66**		**5.95**
114	2016	2.20	1.49	1.23	0.90			5.82
214	2016	1.74	1.12	0.76	0.45			4.06
314	2016	2.30	1.13	0.68	0.62			4.73
414	2016	1.97	1.47	1.12	0.80			5.35
514	2016	1.98	1.68	1.56				5.22
614	2016	2.22	1.12	1.28	1.07			5.70
714	2016	2.17	1.35	1.08	1.06			5.66
1014	2016	2.64	1.36	1.04			0.25	5.30
1414	2016	1.35	1.53	1.09	0.79			4.76
115	2016	1.57	1.40	1.00	0.67	0.80		5.44
215	2016	1.85	1.36	0.88	0.44			4.54
315	2016	1.61	0.88	0.79	0.42			3.70

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
415	2016	1.49	1.35	0.74	1.07			4.65
515	2016	2.37	0.88	0.83	1.03			5.10
615	2016	1.31	0.81	0.76	0.80			3.67
715	2016	1.28	1.09	1.10	0.84			4.31
815	2016	1.94	0.84	0.93				3.70
915	2016	2.54	1.17	1.21				4.93
1015	2016	1.92	1.40	1.31	1.07			5.70
116	2016	2.35	1.14	1.73				5.21
216	2016	1.24	0.94	0.86	0.89			3.94
316	2016	1.45	0.85	0.79	0.84			3.94
416	2016	1.30	0.85	0.71	0.57			3.43
516	2016	1.65	0.82	0.88	0.86			4.21
616	2016	1.36	0.71	0.67	0.89			3.64
716	2016	2.15	1.30	1.26	1.36			6.07
Mean	**2016**	**1.84**	**1.16**	**1.01**	**0.83**	**0.80**	**0.25**	**4.72**
Low	**2016**	**1.24**	**0.71**	**0.67**	**0.42**	**0.80**	**0.25**	**3.43**
High	**2016**	**2.64**	**1.68**	**1.73**	**1.36**	**0.80**	**0.25**	**6.07**
414	2017	1.46	0.79	1.18	1.17			4.60
714	2017	2.03	0.96	1.06	1.20			5.25
115	2017	1.12	1.14	1.04	0.94			4.23
515	2017	1.17	1.01	0.48	0.39			3.05
815	2017	1.97	0.61	0.75	0.57			3.89
1015	2017	2.04	0.98	0.58	0.79			4.39
116	2017	2.37	0.51	0.42				3.30
716	2017	2.00	1.33	1.10	0.90			5.32
117	2017	1.80	0.79	0.78				3.37
217	2017	1.64	1.50	1.10	0.89			5.13
317	2017	0.93	0.80	0.53	0.52			2.78
417	2017	0.97	0.83	0.39	0.42			2.60
517	2017	1.56	1.49	0.78	0.87			4.69
617	2017	1.75	1.15	0.97	0.92			4.79
717	2017	1.09	0.87	0.90				2.85
817	2017	1.99	1.12	0.88				3.99
917	2017	1.48	1.50	1.28	0.66			4.93
1017	2017	2.03	1.46	1.41	0.48			5.38
Mean	**2017**	**1.63**	**1.05**	**0.87**	**0.77**			**4.14**
Low	**2017**	**0.93**	**0.51**	**0.39**	**0.39**			**2.60**
High	**2017**	**2.37**	**1.50**	**1.41**	**1.20**			**5.38**
515	2018	1.03	0.56	0.92	0.59			3.10
1015	2018	1.74	1.29	1.43	0.93			5.40
716	2018	1.76	1.29	1.20	1.08			5.34
117	2018	1.32	1.76	0.86	0.26			4.20
217	2018	1.68	1.60	1.00				4.28
317	2018	1.07	0.85	0.62	0.71			3.25
417	2018	1.29	0.85	0.69	0.65			3.48
517	2018	1.54	1.02	0.78	0.82			4.15
617	2018	1.51	0.95	1.77	0.69			4.93
717	2018	1.43	0.63	1.14	0.78			3.99
817	2018	1.69	1.13	1.12	0.91			4.86
917	2018	1.62	0.76	1.13	0.82			4.33
1017	2018	1.48	0.84	1.42	0.98			4.72
118	2018	1.46	1.20	1.05	1.00			4.72

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
218	2018	1.73	1.00	1.44	1.39			5.56
318	2018	1.22	0.93	1.03	1.01			4.19
418	2018	1.19	1.22	0.99	1.16	0.83		5.39
518	2018	1.23	1.24	0.97	0.82			4.27
618	2018	2.01	1.67	0.81	1.20			5.69
718	2018	1.38	1.65	1.07	0.97			5.06
818	2018	1.43	0.72	0.50	0.65			3.30
918	2018	1.18	1.08	0.28	0.66			3.20
1018	2018	1.50	1.38	1.79	0.90			5.58
1118	2018	1.40	0.55	0.99	0.67			3.61
1218	2018	1.18	1.15	0.98	1.11			4.42
1318	2018	1.57	1.07	0.82	0.62			4.07
1418	2018	1.12	0.78	0.78	0.91			3.59
Mean	**2018**	**1.44**	**1.08**	**1.02**	**0.86**	**0.83**		**4.40**
Low	**2018**	**1.03**	**0.55**	**0.28**	**0.26**	**0.83**		**3.10**
High	**2018**	**2.01**	**1.76**	**1.79**	**1.39**	**0.83**		**5.69**
117	2019	1.42	0.88	0.65				2.95
217	2019	2.14	1.23	1.18				4.55
317	2019	0.80	1.01	0.41	0.66			2.89
517	2019	1.14	1.35	0.60	0.75			3.84
617	2019	1.30	0.92	0.76	0.64			3.62
917	2019	1.36	1.07	0.90	0.79			4.13
1017	2019	1.61	1.11	0.99	0.82			4.53
118	2019	1.04	0.91	0.57	0.86			3.37
318	2019	1.64	1.65	1.01	0.87			5.17
518	2019	1.53	1.44	1.18	1.83			5.98
618	2019	2.30	1.71	1.23	1.16			6.40
718	2019	1.72	1.24	1.13	0.74			4.83
818	2019	1.94	1.51	0.95	0.91			5.32
918	2019	1.79	1.18	0.91	0.62			4.50
1018	2019	1.56	1.72	1.27	0.66			5.22
1118	2019	0.61	0.93	0.52	0.75			2.81
1318	2019	1.14	1.16	0.53	0.73			3.55
1418	2019	1.66	1.09	0.63				3.38
119	2019	1.35	1.10	1.04	0.86			4.36
219	2019	1.54	1.18	0.86			0.46	4.04
319	2019	1.35	0.46	0.66			0.40	2.88
419	2019	1.14	0.85	0.67			0.23	2.89
Mean	**2019**	**1.46**	**1.17**	**0.85**	**0.85**		**0.36**	**4.15**
Low	**2019**	**0.61**	**0.46**	**0.41**	**0.62**		**0.23**	**2.81**
High	**2019**	**2.30**	**1.72**	**1.27**	**1.83**		**0.46**	**6.40**
117	2020	0.70	0.27	0.28				1.25
318	2020	1.48	1.35	1.06	0.50			4.39
518	2020	1.22	0.78	0.78				2.78
618	2020	1.92	1.01	0.82	1.04			4.80
718	2020	1.45	0.71	0.83	0.75			3.73
818	2020	1.15	1.02	0.29	0.68			3.15
918	2020	0.91	0.77	0.93	0.63			3.24
1018	2020	1.33	1.51	1.26	0.83			4.92
1318	2020	0.53	0.86	0.37	0.89			2.65
1418	2020	1.80	1.15	0.83			0.75	4.52
119	2020	1.35	0.59	0.96	0.83			3.73

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
319	2020	1.06	0.60	0.50			1.09	3.25
120	2020	1.53	0.99	1.28	0.85			4.65
220	2020	1.40	0.99	1.30	0.90			4.58
320	2020	0.68	0.85	0.77	0.65			2.95
420	2020	1.01	1.25	1.11	0.77			4.14
520	2020	0.99	0.58	1.14	0.55			3.26
620	2020	1.36	0.86	1.08				3.31
Mean	**2020**	**1.22**	**0.90**	**0.87**	**0.76**		**0.92**	**3.63**
Low	**2020**	**0.53**	**0.27**	**0.28**	**0.50**		**0.75**	**1.25**
High	**2020**	**1.92**	**1.51**	**1.30**	**1.04**		**1.09**	**4.92**
818	2021	1.29	0.97	1.45	0.87			4.58
119	2021	1.47	0.78	1.09	0.85			4.19
120	2021	1.85	1.20	1.16	0.94			5.14
220	2021	2.01	1.32	1.10	0.74			5.17
320	2021	1.23	0.59	0.57	0.59			2.98
420	2021	1.74	0.74	0.87	0.78		0.51	4.64
620	2021	1.28	1.68	0.90	0.61			4.47
121	2021	1.95	1.63	1.40	0.90			5.88
221	2021	1.74	1.19	1.13	0.99			5.04
321	2021	1.76	1.16	1.02	0.83			4.76
421	2021	2.27	1.60	1.51	0.77			6.15
521	2021	1.79	0.84	1.70				4.33
621	2021	2.11	1.19	0.35	1.07			4.73
721	2021	1.99	0.59	1.22	1.06		0.67	5.52
821	2021	1.88	0.78	0.74	0.62		0.64	4.66
921	2021	2.53	0.84	1.40	1.04		0.79	6.60
1021	2021	1.48	1.01	0.97	0.89			4.35
1121	2021	2.00	0.87	1.03	0.96			4.87
1221	2021	1.57	0.57	0.83	0.86		0.74	4.56
Mean	**2021**	**1.79**	**1.03**	**1.08**	**0.85**		**0.67**	**4.87**
Low	**2021**	**1.23**	**0.57**	**0.35**	**0.59**		**0.51**	**2.98**
High	**2021**	**2.53**	**1.68**	**1.70**	**1.07**		**0.79**	**6.60**
120	2022	1.55	0.79	0.60	0.65			3.59
220	2022	1.50	0.96	1.13	0.69			4.27
121	2022	1.89	1.08	0.67	0.79			4.43
221	2022	1.98	1.35	0.93	0.85			5.11
321	2022	1.31	0.72	0.69	0.51			3.23
421	2022	1.47	1.10	0.80	0.62			3.99
521	2022	1.41	0.45	1.06				2.92
621	2022	2.00	0.67	1.13	0.82			4.62
721	2022	1.73	0.68	0.84	0.94			4.19
821	2022	1.60	0.63	0.97	1.05			4.24
921	2022	1.72	1.34	0.87	0.87			4.80
1021	2022	1.67	0.64	0.77	0.83			3.91
1121	2022	1.70	0.60	0.95	1.28			4.53
1221	2022	1.56	0.70	0.89	0.95			4.10
122	2022	1.33	1.05	0.96	1.27			4.61
Mean	**2022**	**1.63**	**0.85**	**0.88**	**0.87**			**4.17**
Low	**2022**	**1.31**	**0.46**	**0.60**	**0.51**			**2.92**
High	**2022**	**2.00**	**1.35**	**1.13**	**1.28**			**5.11**
220	2023	1.61	0.66	1.27	0.79			4.32

Appendix A. Dry matter yield by field, harvest year, cutting, and total season.

Field ID#	Harvest Year	1st Cut DM Yield	2nd Cut DM Yield	3rd Cut DM Yield	4th Cut DM Yield	5th Cut DM Yield	Fall Cut DM Yield	Season DM Yield
121	2023	1.40	0.70	1.06	0.69			3.86
221	2023	2.06	1.10	0.90	1.21			5.27
321	2023	1.28	0.81	0.62				2.71
421	2023	1.34	1.17	0.99	1.10			4.60
521	2023	2.00	0.83	0.89	0.67			4.39
621	2023	2.08	0.84	0.78	1.24			4.94
721	2023	1.56	0.96	0.52	1.08			4.12
921	2023	1.75	0.96	0.59	1.26			4.56
1021	2023	1.22	0.97	1.00	1.09			4.28
1121	2023	1.40	1.01	0.85	1.10			4.36
1221	2023	1.30	0.90	0.61	1.11			3.91
122	2023	2.03	0.90	1.26	0.83			5.02
123	2023	2.06	1.34	1.30	1.11			5.81
223	2023	1.92	1.06	0.89	0.90			4.77
323	2023	1.46	0.85	0.57	0.98			3.86
423	2023	1.65	0.90	0.55	0.94			4.04
523	2023	1.57	0.95	0.64	0.81			3.97
Mean	**2023**	**1.65**	**0.94**	**0.85**	**0.99**			**4.38**
Low	**2023**	**1.22**	**0.66**	**0.52**	**0.67**			**2.71**
High	**2023**	**2.08**	**1.34**	**1.30**	**1.26**			**5.81**
421	2024	1.84	1.13	0.94	0.72			4.63
521	2024	1.92	0.95	0.9	1.16			4.93
621	2024	2.26	1.04	1.12	1.59			6.01
1021	2024	1.84	0.97	0.76	0.66			4.23
1221	2024	2.36	0.86	0.92	0.51			4.64
122	2024	1.51	1.19	1.14	0.78			4.62
123	2024	2.16	1.34	1.33	0.91			5.73
223	2024	2.19	1.52	1.3	0.75			5.76
323	2024	2.01	1.29	0.77	0.43			4.49
423	2024	2.06	1.57	1.1	0.35			5.08
523	2024	1.97	1.24	0.93	0.44			4.58
124	2024	2.12	1.39	1.33	0.92			5.75
224	2024	2.46	1.46	1.11	0.84			5.88
324	2024	1.84	1.11	0.98	0.46			4.40
424	2024	2.59	1.67	1.36	0.95			6.57
524	2024	2.11	1.2	0.46	0.95			4.73
Mean	**2024**	**2.08**	**1.25**	**1.03**	**0.78**			**5.13**
Low	**2024**	**1.51**	**0.86**	**0.46**	**0.35**			**4.23**
High	**2024**	**2.59**	**1.67**	**1.36**	**1.59**			**6.57**