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# Planting date effects on the yield and nutritive value of fall-grown oat cultivars

U.S. Dairy Forage Research Center

For the dairy industry within the north-central U.S., options for producing emergency forage are limited when late-summer or fall inventories are inadequate, primarily because of the relatively short growing season. Fall-grown cereal crops can fill this niche, but knowing what to plant and when to plant it can be a challenge. Recent research has compared different systems for fall-grown cereal crops, and some concrete recommendations have emerged.

## Differences in cereal crops . . .

When most cereal crops are planted in the fall throughout Wisconsin and the north central U.S., they remain leafy or in the vegetative stage of growth throughout the fall and winter and don't elongate (shoot a stem) until the following spring. However, oat is somewhat different; specifically, it will elongate and even produce a seed head before winter sets in. Past research has shown that cereal crops, such as oat, that undergo stem elongation following late-summer establishment will likely exhibit a 2:1 dry matter yield advantage by early winter compared to forages that remain vegetative until spring. But, as with most forages, there can be a trade-off between yield and quality as the plant matures.

Since livestock producers often grow oat for use as a forage, plant breeders have developed forage-type oat cultivars that typically mature at a slower rate than grain-type oat cultivars and generally produce more forage. Previous research at the U.S. Dairy Forage Research Center farm (Prairie du Sac, WI) has shown that fall-grown oat cultivars exhibit limited lignification (or hardening of the cell walls), likely because of cooler growing conditions; they also are energy dense, with estimates of total digestible nutrients (TDN) ranging from 59.2 to 71.6% over a wide range of harvest dates throughout the fall. These traits are generally favorable for supporting dairy production. Furthermore, the potential to ensile oat forages in the late fall is intriguing, and this option also could be considered as a routine part of forage production programs throughout the north central region.

So fall-grown oat seems like a good choice for late-season forage needs in north central U.S., especially for dairy farmers. But how do farmers know which combination of cultivar and planting date to select for their forage needs? How will these selection decisions affect the expected yield and quality of the harvest?

## Comparing four cultivars . . .

The objectives for this project were to evaluate the effects of planting and harvest dates on the yield, nutritive value and energy density of forages harvested from three grain-type oat cultivars (Dane, Ogle, and Vista) and one forage-type oat cultivar (ForagePlus) that typically exhibit maturation characteristics ranging from early (Dane) to very late (ForagePlus).

During a three-year trial from 2007 to 2009, the four oat cultivars were planted on July 15, August 1, or August 15 on a Withee silt loam soil at the University of Wisconsin Marshfield Agricultural Research Station

Four oat cultivars that exhibit maturation characteristics ranging from early to very late were planted on three different dates and then evaluated for yield and nutritive value.

(central Wisconsin). Research plots were relocated annually to different areas within the research station, but a common soil type was used throughout the three-year trial. In order to establish response trends throughout the fall for each combination of planting date and cultivar, five target harvest dates (15 days apart beginning September 15) were designated before the study began and were followed closely over the three-year evaluation period.

Considering both agronomic (Table 1) and nutritional (Table 2) characteristics, results of this study show that the late-maturing ForagePlus cultivar is likely to maximize both yield and nutritive value throughout central Wisconsin when planting dates are extended as late as the first week of August (Figure 1).

When planting dates are delayed beyond the first week of August, the slower maturation rate of ForagePlus becomes an increasing liability. Although yields of ForagePlus were reasonably competitive with grain-type cultivars in the Marshfield study (Table 1), several other studies have shown that more rapidly maturing grain-type cultivars often will exhibit greater yields of DM before winter than forage-type cultivars following a late (mid August) establishment date. In addition, differences in nutritive value between grain and forage-type cultivars become less distinct following late establishment; therefore, under these circumstances, selection of a grain-type cultivar may be a more solid recommendation. ❑

**Figure 1.** Planting dates for fall-grown oats.

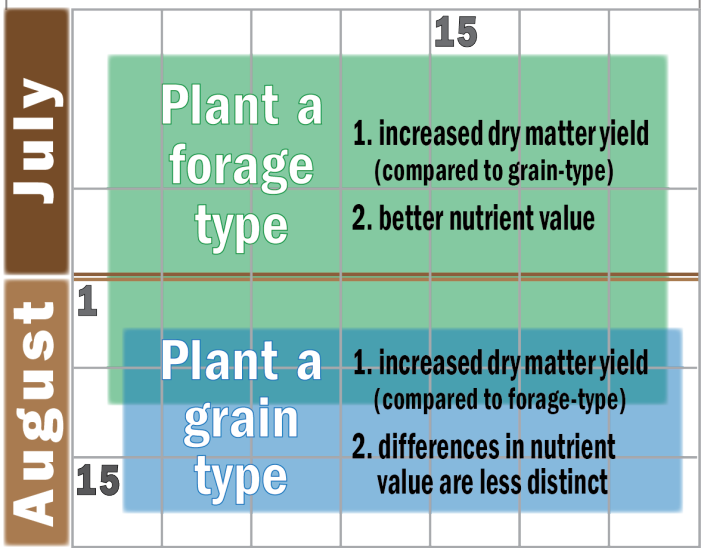


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**Table 1.** Three-year average of maximum yield (pounds of dry matter per acre) as related to planting dates.

| | | Planting dates | | |
|---|---|---|---|---|
| **Cultivar** | **Maturity** | **July 15** | **Aug. 1** | **Aug. 15** |
| | | ------Yield in lbs. dry matter/acre------ | | |
| Dane | Early | 3,489 | 3,491 | 1,580 |
| Ogle | Medium | 3,881 | 3,789 | 1,493 |
| Vista | Late | 4,584 | 4,195 | 1,754 |
| ForagePlus | Very late | 5,841 | 4,756 | 1,672 |

In the north central U.S., late maturing, forage-type oat cultivars are likely to maximize both yield and nutritive value when planted through the first week in August.

If planted later, early maturing, grain-type cultivars will exhibit greater yields of DM before winter arrives, and the difference in nutritive value is less distinct.

**Table 2.** Nutritional characteristics (% dry matter) based on planting dates.

| | In-vitro true digestibility | |
|---|---|---|
| **Planting date** | **Range for all four cultivars** | **ForagePlus difference** |
| July 15 | 60.7 - 71.2% | +9.7 percentage units |
| Aug. 1 | 71.2 - 85.2% | +9.9 percentage units |
| Aug. 15 | 86.8 - 95.8% | +2.7 percentage units |