

## OPTIMIZING MANAGEMENT OF SMALL GRAIN FORAGES

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Small grains are increasingly being used as forages for dairies over the past decade or two. These crops include barley, oats, wheat, triticale, and ryegrass to a certain extent although this crop is usually not thought of as a small grain forage. Small grain forages are often grown similar to grain types but are harvested at boot or soft dough where quality is optimized.

Management practices for small grain crops grown as forage or grain are somewhat different (Table 1). Small grain varieties can be specifically bred for use as forage or grain. The small grain varieties used as forages could be dual purpose and used as forage or grain, or varieties specifically bred for forage. Examples of varieties bred specifically for forage often do not have awns which can irritate the mouths of cattle. Beardless or hooded barley and awnless wheat are examples of small grains specifically bred for forage.

Planting dates for small grains grown for forage or grain can vary quite a bit, although in practice they are often similar. Small grains grown for forages can be planted from September through March, whereas the optimum sowing time for grain is late November to early December. Forages can be planted earlier and later since the risk of frost is not an issue with early planting if harvested at boot and heat damage with late planting is not as important because forage is harvested earlier than grain.

Seeding, fertilizer, and irrigation amount can be higher for a forage compared to a grain crop without negative consequences. The reason is that excess of these management inputs can lead to lodging, lower grain to straw ratio, and reduced yield in a grain crop but not necessarily for a forage crop. Lodging is not desirable in a forage crop any more than a grain crop, but forage harvesters are more likely to pick up a lodged forage crop than combines for a grain crop. A higher seeding rate is possible for a forage than grain crop due to the desirable effect on stem thickness and lodging being not quite as detrimental. Fertilizer requirement can be lower for a forage crop since the growth period is shorter than for a grain crop and late applications of nitrogen at flowering to increase grain protein are not typically required for a forage crop. However, due to the reduced importance of lodging, forage crops can tolerate higher nitrogen rates without negative effects. Manure and lagoon water is often applied to forage crops because of this but also due to the proximity to dairies. Similar to fertilizer, the water requirement for a forage crop can be less than a grain crop due to the shorter season, but higher irrigation amounts can be tolerated by forage crops due to the decreased importance of lodging in a forage compared to a grain crop.

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Pest control including weeds, insects, and diseases can be more or less important in forage compared to grain crops depending on the circumstances. In general, pest control is less important in forage compared to grain crops due to the disproportionate effect pests can have on grain compared to forage yield. Controlling weeds can reduce overall forage yield due to the contribution of weeds to the biomass harvested. Some weeds can actually have high forage quality. However, certain weeds can be toxic to cattle and weeds can contribute to variability in forage quality that is undesirable. Insects can have a disproportionate effect on grain compared to forage yield. Chemical disease control is generally not economical in small grains and varietal resistance is the preferred method of control whether grown for grain or forage. There are some diseases of small grains that are important if grown for grain but not forage such as wheat scab, fusarium head blight, which produces a toxin in the grain which has a lower tolerance threshold in wheat used for food rather than feed.

Small grain forage can be harvested at boot or soft dough, but the soft dough stage is perhaps more typical. The forage quality profile differs of course when comparing the boot and soft dough stage, and dairies may have preferences for one over the other. The advantage of the soft dough stage is higher forage yield and lower harvest cost compared to harvesting at boot multiple times. Small grain crops can be fed as a direct cut forage, but is more typically wilted, chopped, and ensiled. The logistics of a forage harvest can be more difficult than grain since timeliness of harvest is more important.

Table 1. Management practice comparison for small grains crops grown for grain or forage.

Management practice	Grain	Forage
Variety selection	Grain varieties	Forage varieties
Planting date	Winter	Fall to spring
Seeding rate	Medium	Higher
Fertilizer rate	Medium	Lower to higher
Irrigation amount	Medium	Lower to higher
Weed control	Important	Not as important
Insect control	Important	Not as important
Disease control	Important	Not as important
Harvest	Grain ripe stage	Boot or soft dough