Alfalfa-grass: Know the risks, know the benefits
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Grazing alfalfa-grass mixtures
Including legumes in a pasture mix has many benefits for cattle-grazing operations in the Midwest. Grass-legume mixture yields are similar to grass monocultures fertilized with upward of 100 to 200 pounds of nitrogen per acre. With the cost of fertilizer around 30 cents per pound, grass-legume mixtures can result in substantial cost savings. Legumes also provide greater protein concentration and other soluble cell contents compared to grass monocultures, and cattle intake rates are greater for legumes than grasses. In turn, this increase in forage quality and intake results in greater average daily gain (ADG) and gain per acre for grazing beef cattle.

The most popular legumes for grazing in the Midwest are red clover and white clover, with only a few producers utilizing alfalfa in their pastures. Red clover tends to be one of the most popular legumes because it can be frost-seeded in early spring, helping to mitigate issues with low legume persistence. Though red clover seed is relatively inexpensive, frost-seeding success is generally lower than 50%, making frost-seeding a relatively risky strategy.

Low legume persistence is also a concern with using alfalfa in pastures. Under grazing conditions in the Midwest and Canada, researchers have found the length of persistence for grazed alfalfa to be three to four years. However, this lifespan is similar for all grazed legumes, with the exception of Kura clover, in which 20-year stands are still productive at the University of Wisconsin Lancaster Research Station.

A second concern with using alfalfa in pastures is the threat of bloat. Bloat occurs when rapid consumption of legumes causes gases to accumulate in foam in the rumen, which can lead to death. Bloat can occur on all legumes but is a concern for alfalfa because alfalfa proportion can be high, particularly in the first year. The variability in alfalfa proportion is a result of several different factors including alfalfa and grass seeding rate, soil moisture and temperature, and grass species and variety. Companion grasses sown with alfalfa reduce the risk of bloat while also extending the life of the pasture by mitigating low legume persistence. Despite these concerns, alfalfa-grass mixtures have great potential for pastures in the Midwest because of the superior quality and yield of alfalfa-grass mixtures.

Testing specific alfalfa-grass mixtures
Researchers at the University of Wisconsin set out to test cattle performance on three binary alfalfa-grass mixtures: alfalfa with meadow fescue, tall fescue or orchardgrass. This grazing study took place from 2014 to 2016 with 550-pound Holstein steers rotationally grazing from May until October. Forage samples were taken weekly before and after grazing. The alfalfa variety used in this study was alfalfa cultivar Amerirand 403TPlus sown at 7 pounds per acre with the companion grasses. The three companion grasses were Pradel meadow fescue sown at 22 pounds per acre, Baratine tall fescue sown at 16 pounds per acre and Satin orchardgrass sown at 3 pounds per acre in mid-August 2013. Cattle grazing and data collection began in spring 2014 and continued through to fall 2016 at the University of Wisconsin Arlington Agricultural Research Station near Arлингton, Wisconsin.

Challenges with alfalfa-grass proportions
In this case, all alfalfa proportions, as shown in Figure 1, started equally high in the first year, 77% in 2014, but by 2016 alfalfa proportions were much lower, around 40% for alfalfa-meadow fescue and only 20% in alfalfa-orchardgrass and alfalfa-tall fescue. In the Midwest, alfalfa proportions can be very high in the first grazing season, creating bloat-provoking pastures that may need to be mechanically harvested. This research found bloat can be avoided by grazing mixtures with alfalfa proportions of 60% or less. Figure 1 also shows the rapid decrease in alfalfa proportions due to low persistence and competition with the companion grass species.

Forage production and nutritive value
High alfalfa proportions in 2014
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- when alfalfa proportions are between 40% and 60%, there is little threat of bloat, and cattle performance can achieve 1,000 pounds of gain per acre.
resulted in pastures that were too blust-provoking for grazing; therefore cattle only grazed these pastures in 2015 and 2016. Yield values for pasture can vary widely, and a good reference for alfalfa-grass pasture is not available, but yield is generally lower than hay harvested. In this study, alfalfa-grass yield was relatively high, with similar yields across binary mixtures in 2015 averaging around 4.2 tons dry matter per acre. In 2016, mixtures varied slightly, with alfalfa-meadow fescue and alfalfa-tall fescue producing nearly 5 tons per acre compared to 4.4 tons per acre for alfalfa-orchardgrass.

Over 2015 and 2016, mixtures differed by year, with slightly reduced crude protein (CP) in alfalfa-tall fescue and alfalfa-orchardgrass pasture in 2016, although all mixtures had excessively high CP, averaging around 21% for both years. Due to the decline in percentage of alfalfa in the sward, all alfalfa-grass mixtures increased in neutral detergent fiber digestibility from 56% in 2015 to 65% in 2016. Grasses contain greater amounts of digestible neutral detergent fiber (NDF), while legumes contain more cell solubles and CP. The changes in forage nutritive value over time were related to declines in alfalfa proportion rather than effects due to grass species.

**Stear performance**

As Figure 2 (page 33) shows, animal performance among mixtures was similar in 2015, when alfalfa proportions were high at 60%, averaging around 1.7 pounds per day. In 2016, alfalfa-meadow fescue pastures maintained high cattle gain, while ADG in alfalfa-orchardgrass and alfalfa-tall fescue pastures was 1.2 pounds per day. Gain per acre was high in 2015, reaching nearly 1,000 pounds per acre in all mixtures. In 2016, gain per acre in alfalfa-meadow fescue was maintained at about 1,000 pounds per acre, while alfalfa-tall fescue and alfalfa-orchardgrass averaged around 680 pounds per acre. Therefore, alfalfa proportions of 40% or greater maximized Holstein steer performance and gain per acre.

**The best mixture**

Alfalfa proportion in the mixture was the most influential factor on forage quality and performance of grazing cattle, even greater than the companion grass species. High proportions of alfalfa can overshadow differences caused by grass species in alfalfa-grass pastures, which then results in minor differences in forage nutritive value, ADG, and gain per acre due to grass species. However, meadow fescue demonstrated the greatest compatibility with alfalfa by maintaining the highest alfalfa proportions after three years, resulting in the highest ADG and gain per acre.

**Should I consider alfalfa-grass mixtures for my pasture?**

Much like other legumes, alfalfa proportions are difficult to predict and vary widely based on several factors. For the first production year, producers may need to focus on strategies to best manage cattle on blust-provoking pasture or consider alternative uses such as hay or silage. However, when alfalfa proportions are between 40% and 60%, there is little threat of blust, and cattle performance can achieve 1,000 pounds of gain per acre.