

**2019 Challenge: Forage Production Options for Ohio
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Dianne Shoemaker, Mark Sulc, Bill Weiss, Sarah Noggle

Across Ohio, farmers are facing challenges unimagined just four months ago. Widespread loss of established alfalfa stands coupled with delayed or impossible planting conditions for other crops leave many farmers, their agronomists and nutritionists wondering what crops can produce reasonable amounts of quality forage yet this year. In addition, frequent and heavy rains are preventing harvest of forages that did survive the winter and are causing further deterioration of those stands.

With July 1st just around the corner, Mark Sulc, OSU Extension Forage Agronomist and Bill Weiss, OSU Extension Dairy Nutritionist, help address this forage dilemma. If one is looking for quality and quantity, what are your best options? The article starts with a quick summary of options and then dig into some of the pros and cons of these options (listed in no particular order of preference).

Options

1. Corn plant silage– Still has the highest potential yield but silage quality will decline with delayed planting and getting it harvested at the right moisture is the biggest risk.
2. Forage sorghum – Brown midrib (BMR) varieties are best for lactating cows. Conventional varieties are okay if BMR seed is not available.
3. Sorghum-sudangrass - BMR varieties are best for lactating cows. Conventional varieties are okay if BMR seed is not available.
4. Sudangrass - BMR varieties are best for lactating cows. Conventional varieties are okay if BMR seed is not available.
5. Oat or spring triticale silage – Safer option than corn silage but lower yield than corn silage. Can be mowed and allowed to wilt to correct harvest moisture. Spring Triticale is commonly planted as a hay or haylage crop and can produce high levels of dry matter under challenging conditions. It is later maturing than oats or barley and will maintain its forage quality for an extended harvest window.
6. Oat and Winter Rye mixed silage – Has the advantages of oat silage with a slightly higher yield in the fall and the potential for rye silage harvest in the spring.
7. Italian Ryegrass silage – Small fall harvest with three cuttings next year starting in April.
8. Soybean silage – If you need a replacement for alfalfa, soybean silage is a reasonable alternative. Care must be taken with spray programs that allow harvest as a forage.
9. Teff – Is a warm-season annual grass best suited for Sheep and Beef, lower yield than sorghum grasses despite multiple harvests being possible.
10. Millets – Millets are a major grain crop worldwide and best suited for beef and sheep, many will produce a single harvest.
11. Brassicas - High in energy, but very low in fiber (more like a concentrate) with high moisture content. Only for grazing by Sheep and Beef.

Note: These forage options all require adequate nitrogen fertilization to maximize yield potential. Check any potential herbicide restrictions from the previously planted crop. Work with your nutritionist to incorporate these alternative forages into properly balanced rations.

Option 1: Corn silage

The biggest risk with late-planted corn is getting moisture down to a reasonable level at harvest. With current soil moisture conditions, it will be a crap shoot when many farms will be able to plant. Corn planted into July will not make corn silage as we know it because it won't have many ears and will be low in starch. This silage will primarily be a source of fiber with potential yields about half of normal.

Harvesting corn silage at the proper moisture will be critical to a successful fermentation (drier than 30% DM up to about 40% DM). Before a frost, many of these plants will be about 20% DM. Some late-planted corn may require a frost to allow the plant to dry down. Because leaves die after frost, plants look drier than they actually are, so measuring dry matter regularly is essential. When a plant is frosted, the window of opportunity to harvest as silage - before the plant is too dry - may be limited depending on local weather conditions. Harvest timing is critical, so regularly monitor plant moisture post-frost and be ready to harvest when conditions are met. Another possible option for corn with no ear would be to mow at some point before a killing frost and wilt the crop to the proper dry matter before chopping and ensiling the crop.

This high fiber feed will probably contain about 60% NDF. Work with your nutritionist as substantial diet changes must be made. More than likely these changes will include increased feeding of corn grain. With higher corn prices looming, this is not an attractive option, but the tradeoff is feeding more expensive hay.

Check with seed supplier for any seed treatment restrictions on the use of the corn seed for silage or forage when planted this late.

Option 2-4: Forage sorghum, Sorghum-sudangrass hybrids, Sudangrasses

Brown midrib (BMR) varieties are most desirable, but the seed may not be available. If this is the case in your area, conventional varieties are your next best choice. Plant by July 15th and plan for one cutting. A mid-September cutting will optimize quality for milking cows. An early October cutting will have a much higher yield, but the higher-fiber forage will be more suited for heifers, dry cows, or beef cattle.

Sudangrass harvested at 50 days of growth is an okay feed for dairy cattle. At a 60-day harvest range, it is more challenging to feed to dairy cows for good milk production.

Challenges: If the sorghums are frosted, prussic acid formation in the plant is an issue. It can be mitigated by ensiling, but avoiding frost is the best option.

Option 5: Oat or Spring Triticale silage

Do not plant these for silage before the last week of July or overall yield will suffer. The overall potential yield is the lowest of the forage options. Yields of 1.5 to 3 tons of DM per acre (about 5 to 5.5 tons at 30 to 35% DM) of chopped oat silage are possible if planted in early August. Harvesting between late boot, or early heading, will optimize quality.

Potential feed value of oat will be similar to mid-bloom alfalfa. As a grass, inclusion rates in a lactating cow diet would have to go down, but it is a very acceptable feed.

Spring Triticale is biotype of the hybrid cross between cereal rye and wheat (there is a winter biotype that acts like winter wheat). In our research, oat averaged slightly higher fall yields than spring triticale, but this varied with season. Spring triticale yields a higher feed value similar to early mid-bloom alfalfa. Seed cost for spring triticale will be higher than oat, but it is later maturing than oat or barley and will maintain its forage quality for an extended harvest window. Spring triticale yields a higher feed value similar to early to mid-bloom alfalfa.

These forage options all require adequate nitrogen fertilization to maximize yield potential. Check potential herbicide restrictions from the previously planted crop. Potential challenges include rust infection in damp conditions, especially with oat. Rust could impact yield and feed quality and depends on when the infection of rust occurs during the growing season.

Option 6: Oat or Spring Triticale and Cereal Rye mixed silage

Planting mixtures of oat or spring triticale and cereal rye will allow a fall harvest as well as a spring harvest. Note that the window for harvesting rye silage in the spring to optimize feed quality is usually very short. The rye harvested in early spring can yield 2.5 to 3 tons of DM per acre of dairy-quality forage when harvested at boot stage. In the fall, the oat/rye or spring triticale/rye mix should yield slightly more than oat or spring triticale alone, with the potential for the spring cereal rye harvest.

Option 7: Italian Ryegrass silage

This crop emerges as fast as oats and could produce up to a ton of dry matter per acre in the fall if planted in August, and less yield if planted into September (it should be planted by mid-September at the latest). This crop would also be available for additional cuttings next year, starting in late April or early May and then every 25-30 days.

Plot work with fall harvest and three harvests the following year have shown average yields between 3 to 5 tons of dry matter from improved varieties with good winter survival and adequate moisture. It will winterkill in severe winters. Do not let a lot of growth go into the winter to avoid winter as mold growth that damages the stand. To avoid this, make a late fall cutting or graze to a height of 3 inches. This crop will shut down by mid- to late-summer the year after a fallen establishment.

As a grass, harvesting earlier optimizes quality. If planted in September and harvested in late fall, the quality will be superb (NDF 48% and Neutral Detergent Fiber digestibility (NDFd) about 80%). August plantings harvested in late fall will not be quite as high in quality. It will probably have protein in the mid-teens and NDF in the mid-50s. Next year, the crop will head out quickly at each harvest. Overall it is a medium quality forage, but with proper diet, this formulation can work for lactating cows.

Option 8: Soybeans

Soybeans planted at this time of year and harvested as silage will yield about 2 tons of dry matter per acre (dry plants to 65 to 70% moisture before chopping). Narrow rows will yield about 15% more than wide rows. Harvest between R5 and R7 stage, but no later than R7 (one pod on the stem is a mature color).

Silage harvest will be easier than dry hay because of difficulty in getting the crop dry. Silage harvesting later creates issues with the high oil content of the beans, and more leaf shatter will inhibit a good fermentation. Harvesting later than R5 to R7 creates an issue with the high oil content of the beans, and more leaf shatter will inhibit a good fermentation. Feed quality would be similar to early bloom alfalfa.

Check seed treatment labels or ask seed supplier for any restrictions on using soybean seed for forage, as some seed treatments may not allow it. Review any herbicides applied and see label for restrictions before use to verify that the crop can still be used for animal feed.

Adding an annual grass such as oats, spring triticale, or sudangrass could be a good option to lower the protein content for some classes of livestock and improve the mechanical handling of this crop.

Option 9: Teff

Teff is a warm-season grass that can be used for hay, silage, or pasture. The first crop should be ready in 40 to 50 days. It may produce up to 2 to 2.5 tons per acre of dry matter in multiple cuttings and can tolerate both drought-stressed and waterlogged soils.

Cornell research showed that when teff was harvested at the proper time and sufficient N was applied, crude protein was between 15 and 16% of dry matter and neutral detergent fiber (NDF) 48-hr digestibility averaged about 60%. It should be planted as soon as possible because it dies at the first frost.

Option 10: Millets These summer annuals can be used as hay, silage, green chop, and pasture. There are varietal differences between the pearl, foxtail, proso and Japanese types. Because of evidence that Pearl Millet may cause butterfat depression in lactating dairy cows, millet forages are better suited for beef, sheep or dairy heifer feed.

Option 11: Brassicas

Turnip, swede, rape, kale, and other brassica species and hybrids are highly productive annual crops that can be grazed 80 to 150 days after seeding. When planted by early August they can extend the grazing season in November and December. They are highly digestible and crude protein levels are high, varying from 15 to 25 percent in the herbage and 8 to 15 percent in the roots depending on the level of nitrogen fertilization and weather conditions. These species contain high moisture content, so they should be used for grazing only. Brassicas have very low fiber and high energy and should be treated more like a concentrate than as forage in diets.

References: More detailed information on many of these options including seeding rates are available in these publications:

- Supplemental Forage Options for Late Summer to Early Autumn Planting: <https://agcrops.osu.edu/newsletter/corn-newsletter/2015-22/supplemental-forage-options-late-summer-early-autumn-planting>
- Feeding Low Forage Diets to Dairy Cows: https://dairy.osu.edu/sites/dairy/files/imce/DIBS/DIBS33-16_Feeding_Low_Forage_Diets_to_Dairy_Cows.pdf
- Fall-grown Oat Forages: <https://fyi.extension.wisc.edu/forage/fall-grown-oat-forages-cultivars-planting-dates-and-expected-yields/>
- How Late can you Plant Corn for Silage? https://www.canr.msu.edu/news/how_late_can_you_plant_corn_for_silage
- Forage and Bedding Shortage Issues: <https://dairy.osu.edu/newsletter/buckeye-dairy-news>
- Soybeans for Hay or Silage <https://fyi.extension.wisc.edu/forage/soybeans-for-hay-or-silage/>
- Teff as an Emergency Forage: <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet24.pdf>
- Millets Forage Management: <https://www.extension.iastate.edu/sites/www.extension.iastate.edu/files/iowa/MilletFS55.pdf>
- Growing and Managing Forage Cover Crops http://mccc.msu.edu/wp-content/uploads/2016/10/OH_2015_Using-Cover-Crops-as-Forage-051815.pdf
- Brassicas: http://www.forages.psu.edu/topics/species_variety_trials/species/brassica/char_adapt.html
- Emergency Forages for Planting Early to Mid-Summer: <https://agcrops.osu.edu/newsletter/corn-newsletter/2019-14/emergency-forages-planting-early-mid-summer>
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Definitions

- BMR: Brown midrib - Brown midrib (BMR), a genetic mutation in several grassy species, reduces lignin content in the total plant parts. Lignin is mostly indigestible but also plays an important role in plant rigidity. The brown midrib trait has been incorporated into forage sorghum, sudangrass, and corn.¹
- DM: Dry Matter – feedstuff sample remaining after the water is removed; 100 minus moisture % = DM %.
- NDF: neutral detergent fiber – a percentage of cell walls or other plants structural material present; includes cellulose, hemicellulose, and lignin; only partially digested by cattle; greater NDF values are associated with less dry matter intake.
- NDFd: Neutral detergent fiber digestibility (NDFd) is a measure used to improve the predicted energy value of forages. The digestibility of NDF can be measured by either In vitro or In situ methodology. Incubation times vary, although 24, 30, or 48 hours are typical times used by commercial labs. Using the amount of NDF present at the beginning of the incubation and the amount of NDF remaining at the end of the incubation, NDF digestibility is calculated (often this is called NDFd). NDFd values will vary across laboratories, as there will be differences in either rumen fluid (In vitro) or rumen environment (In situ). For this reason, it is important to compare forage reports from a single lab.²

Find more detailed information:

- Common Terms used in Animal Feeding and Nutrition
<https://extension.uga.edu/publications/detail.html?number=B1367&title=Common%20Terms%20Used%20in%20Animal%20Feeding%20and%20Nutrition>
- Determining Forage Quality: Understanding Feed Analysis
<https://extension.psu.edu/determining-forage-quality-understanding-feed-analysis>

References

¹Miller, F.R., J.A. Stroup, Brown Midrib Forage Sorghum, Sudangrass, and Corn: What is the Potential?, 2003. <https://alfalfa.ucdavis.edu/+symposium/proceedings/2003/03-143.pdf>

² The ABC's of forage analysis – fiber & digestibility, 2013.

<http://www.milkproduction.com/Library/Scientific-articles/Nutrition/The-ABCs-of-forage-analysis--fiber--digestibility/>

Dianne Shoemaker, Extension Field Specialist, Dairy shoemaker.3@osu.edu

Mark Sulc, Extension Forage Agronomist, sulc.2@osu.edu

Bill Weiss, Extension Dairy Nutritionist, weiss.6@osu.edu

Sarah Noggle, Extension Agriculture and Natural Resources Educator, noggle.17@osu.edu

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