# Use of Annual Forage Crops as Baleage

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Many producers in high rainfall areas across the eastern half of the U.S. have adopted bale silage forage conservation systems. They hope to avoid rain damaged forage, high field losses, and low quality often associated with storing forages as hay. In the Southern U.S., annual forages have been widely used by dairymen as baleage crops since these forages typically have high nutritive value but are often difficult to cure as hay. Italian or annual ryegrass is the first choice of many dairymen since it may be used for grazing, cover crop, or silage. Currently, nearly 3,000,000 acres of ryegrass are planted in the U.S. annually with over 80% being sowed in southern states. Yet, alfalfa stand losses from last winter have more Midwestern dairymen checking out Italian ryegrass as an emergency forage having the potential to substitute for alfalfa and corn silage in high producing dairy cows diets.

In the Southern Midwest, Italian ryegrass may be fall planted and has a good chance of surviving and producing well the next spring and summer. In fact, variety trials in Southern Ohio indicate that in cool, moist summers, well-fertilized ryegrass will produce 5-7 tons of forage DM over the growing season. But, variety matters. Marc Sulc, Ohio State University, reported that even with near record low temperatures of -20˚ to -25˚F, several more cold tolerant fall-planted varieties survived the winter due to good snow cover. Further north, annual ryegrass fits well planted in late spring following wheat harvest or directly into thin alfalfa stands. Dan Undersander, University of Wisconsin, reported season-long harvests of 3-4 tons of ryegrass DM from most varieties planted in Wisconsin during the 2013 growing season (July-October). The good thing about planting annual ryegrass in the spring is it requires cool weather to initiate flowering so forage nutritive value remains high throughout the summer. This is no news to S & S Dairy in Royalton, MN. They submitted an Italian ryegrass haylage sample to the World Dairy Expo this year and won first place in the haylage category at the Super Bowl of Forages (crude protein of ~16%; phenomenal RFQ of over 250).

Italian ryegrass also works well as a baleage crop for small to moderate-sized operators who lack equipment and storage structures for haylage production. The secret to making high quality ryegrass is to pay attention to details including fertilizing with adequate nitrogen, wilting in wide windrows to 40-60% DM, baling slow to maximize bale density, using untreated sisal or plastic twine, and wrapping with 6-8 layers of stretch film. In the vegetative state, ryegrass contains moderate levels of water soluble carbohydrates available for fermentation but these may increase to 15-18% of DM as plant matures (Table 1). High protein in ryegrass tends to elevate buffering capacity and, coupled with restricted sugar availability related to long particle length, yields a restricted fermentation with a higher final pH compared to ryegrass haylage. However, ryegrass baleage usually experiences <5% shrink over 6-9 months of storage and generates animal performance comparable to ryegrass haylage provided baleage is processed to reduce particle size. A precaution to first time ryegrass feeders is to limit access to ryegrass for close up dry cows. High levels of potassium commonly found in ryegrass may predispose cows to milk fever.

**Table 1.** Production, fermentation, and quality characteristics of Italian Ryegrass and BMR Forage Sorghum conserved as baleage.[1]

| | Italian Ryegrass | BMR Forage Sorghum |
|---|---|---|
| Yield, ton DM/ac/cutting | 1-2 | 2-3 |
| Days to harvest | 45-60 | 35-60 |
| Wilting interval, hrs" | 6-48 | 24-48 |
| Water soluble carbohydrate, %[2] | 8-15 | 8-18 |
| Buffering capacity, Meq NaOH/kg[3] | 430 | 200 |
| pH | 4.7-5.2 | 4.1-4.6 |
| DM, % | 45-55 | 30-40 |
| Crude protein, % | 15-22 | 12-15 |
| ADF, % | 30-38 | 36-42 |
| Lignin, % | 4.0-8.0 | 2.5-4.0 |
| NDF, % | 52-60 | 68-75 |
| TDN, % | 64-72 | 60-68 |
| IVTD, % | 75-88 | 72-82 |
| RFQ | 125-150 | 100-120 |

[1] *Italian ryegrass harvested at boot-stage and BMR forage sorghum at 4-5' height (vegetative).*
[2] *Estimate of sugar available for ensiling.*
[3] *Ability to resist pH declines (higher the buffering capacity, the more difficult to lower pH and ensile).*

Another group of annual forages gaining attention among bale silage users are brown mid rib (BMR) summer annuals such as BMR forage sorghum, sorghum sudans, sudan grasses, and millets. These BMR summer annuals are lower in lignin and fiber and higher in sugar and digestibility than conventional summer annuals. Typically, they require a soil temperature of 60˚F or higher for optimum growth. Usually double (ratoon) cuttings may be made in the Southern Midwest, but a shorter growing season restricts them to a single harvest in more northern climates. Generally, these BMRs grow rapidly, are drought resistant, and produce 2-3 tons DM/ac/cutting in multiple harvests and as much as 3-5 tons of DM in single harvests (Table 1). Yield drag between BMR and conventional summer annuals has largely disappeared. If multiple harvests are planned, harvest is recommended when plants reach 4-5' in height (vegetative); if a single harvest is planned, harvest at boot stage. Use of a flail type mower conditioner is recommended to break up large stems affiliated with summer annuals. This speeds drying and frees sugars accelerating fermentation. Even with conditioning it is difficult to reduce dry matter of these high moisture crops to recommended levels before baling. However, inherently low buffering capacity and high sugar content of these crops promotes a rapid lactic acid fermentation generating a well-preserved baleage crop. Since forage is harvested prior to seed head formation, lodging is rarely an issue with summer annuals used for bale silage. Typically, they have moderate quality potential and would be most suitable for feeding to late lactation cows or heifers.

Other annual forage crops that may find a place in your operation are cereal grains such as oats, barley, and triticale plus brassica, annual legumes, and others. Still, Italian ryegrass has as much potential as any. Given its high nutritive value potential and ongoing development of more cold-tolerant varieties, it may become more than emergency forage for Midwestern producers.